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PROGRESS



FEBRUARY, 1946

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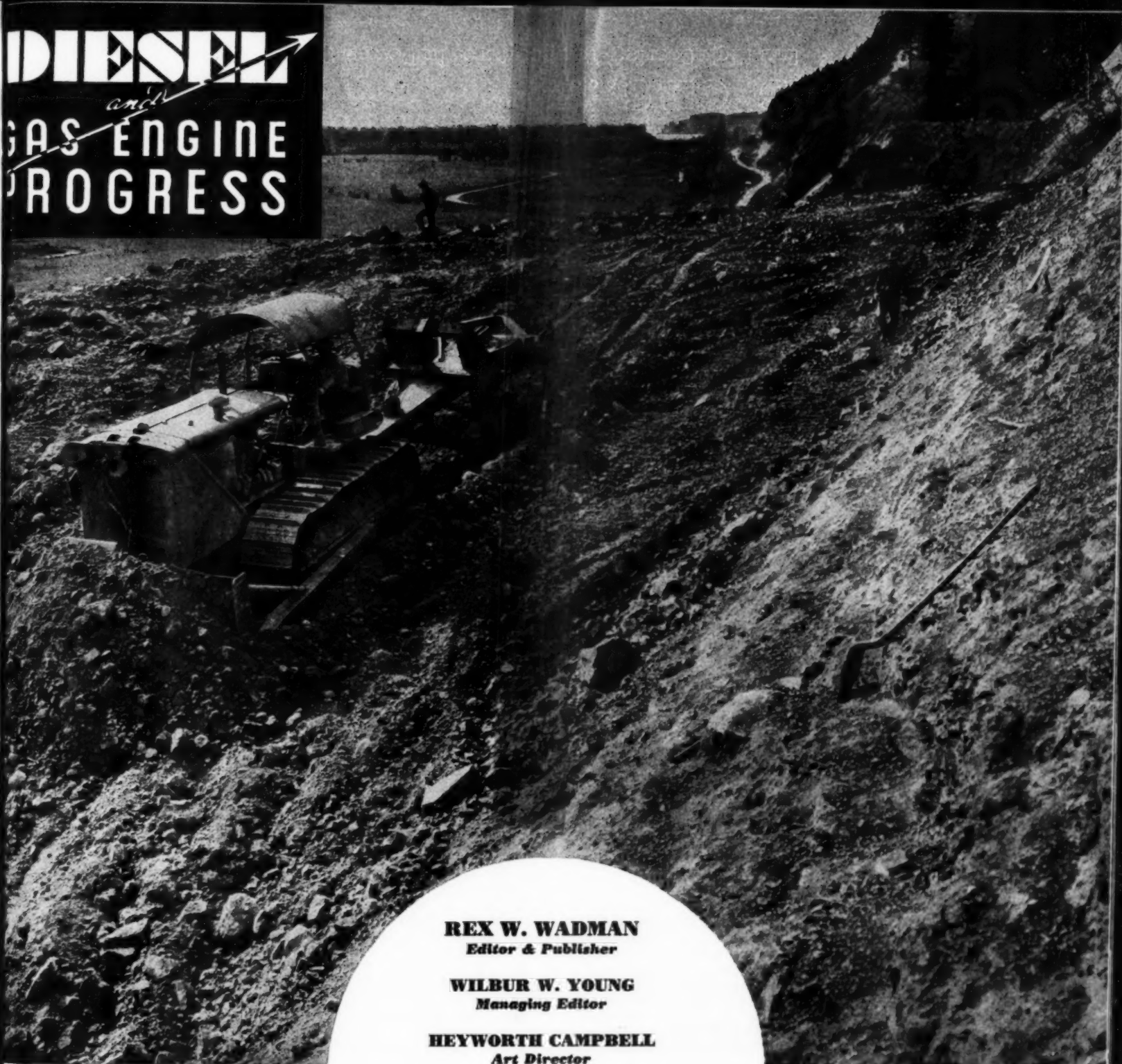
TEXACO URSA OILS

FOR ALL DIESEL ENGINES

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS ★ METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS

DIESEL PROGRESS, for February, 1946. Volume XII, Number 2. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 W. Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1943, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: \$5.00 per year, single copy, 50c.

DIESEL and GAS ENGINE PROGRESS



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FEBRUARY CONTENTS

Analysis Of Intercooled Supercharging	39
Coon Rapids, Iowa	42
Diesel Fishers Princesses Pat & Anne	44
Problem Of Starting Motors On Small Generators	46
Low Cost Snow Removal With Diesels	49
Large Diesel Tuna Clipper, "Chicken Of The Sea"	50
Diesels Recover Farm Land	54
Turbocharged Diesels For UNRRA	56
Diesel Yacht Tests New Marine Instruments	57
Great Northern R.R. Diesel Shop At Havre, Montana	58
Small Air-Cooled Diesel Announced	61
Diesel Paid Off	62
Diesel Handyman Around Steel Plant	64
Smoke Detection System For Diesel Locomotives ..	65
Supervising And Operating Engineers' Section ...	66
Exchange Your Diesel Maintenance Ideas Section	68

FRONT COVER ILLUSTRATION: Winter logging in Poison Lake District, California. The Caterpillar Diesel tractor with Hyster Arch is yarding logs to steam jammer landing.

TABLE OF CONTENTS ILLUSTRATION: Relocation of Route 99, North of Woodland, Washington necessitates cutting off hillsides with cuts up to 220 ft. A Caterpillar Diesel tractor and Pilot Bulldozer, with Rooter trailing, are seen at work on the job.

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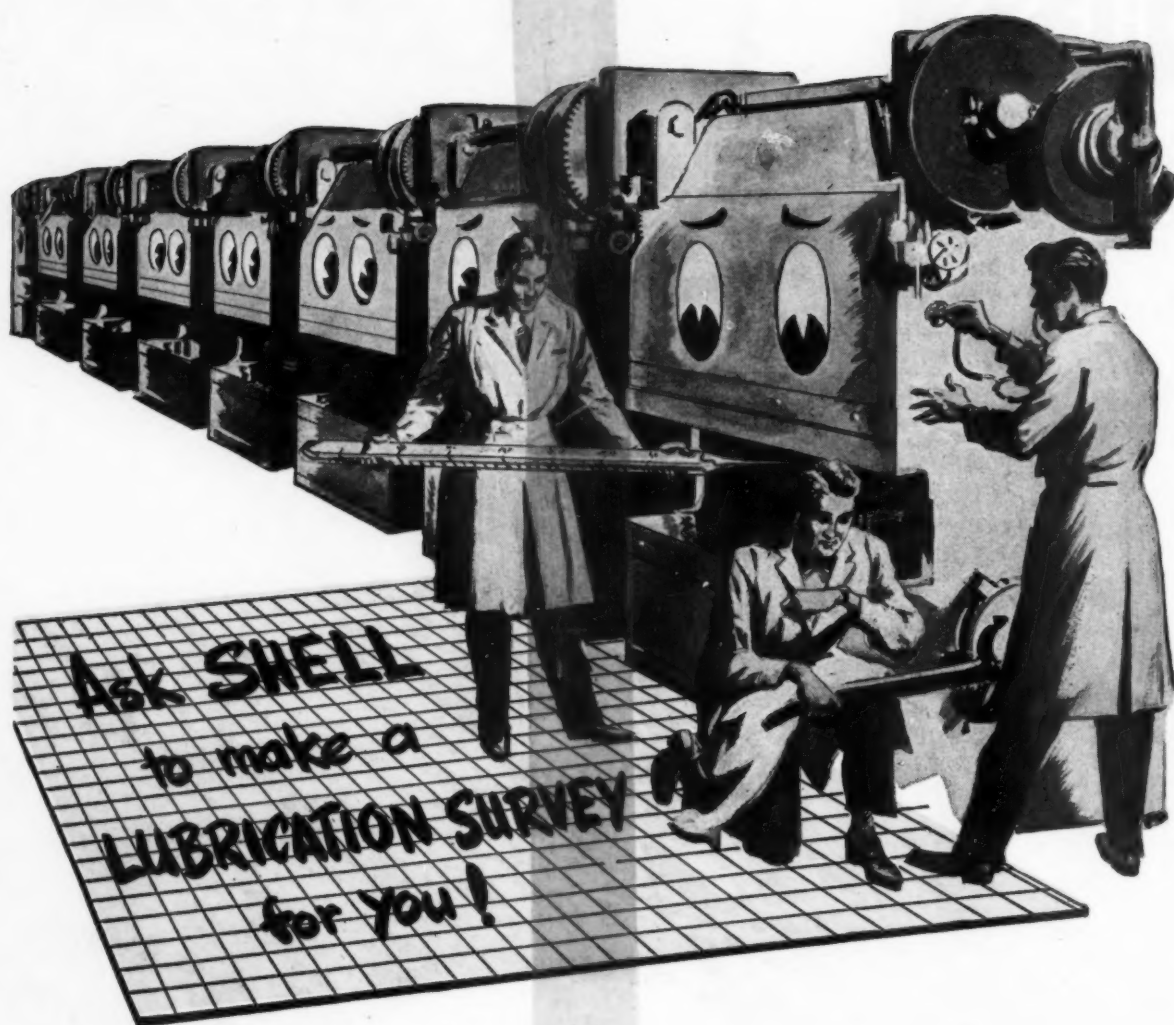
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AN and Diesel engine the A.S.M. try now permits m Ralph M. lated on the devel internal c he finds t is limited internal s sustain co which the may be in exceeding temperatur

In a previous summed u ure I, as standard 133% of t with the s senting a acteristics to increase convention shows the e charging to a correspon sure. Since conducted garding int relate calcu surface tem obviously a peratures. tested at 32 rate equipn flow to the also availab of air intake Cooling wa 155 degrees tained const

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AN ANALYSIS OF INTERCOOLED SUPERCHARGING

Notes On A Paper Delivered Before The American Society of Mechanical Engineers By Mr. Ralph Miller of the Nordberg Manufacturing Company.

AN analysis of intercooled supercharging of Diesel engines as prepared and presented to the A.S.M.E. is of timely interest to the industry now that the absence of war-time demands permits more time for reflection and research. Ralph Miller of Nordberg is to be congratulated on his advanced thinking which led to the development of his thesis. Treating the internal combustion engine as a heat engine, he finds that with present materials the output is limited by the temperatures reached in the internal surfaces rather than by lack of air to sustain combustion. A method is developed by which the output capacity of four cycle engines may be increased by more than 100% without exceeding practical and previously established temperatures of internal surfaces.

In a previous A.S.M.E. paper (1942) the author summed up his analysis in a rating graph, Figure I, as follows: Curve A shows that with standard supercharging without air cooling 133% of the MIP is carried at 4 psi pressure with the same cycle mean temperature, representing a gain of 36% in BMEP. The characteristics of Curve A clearly indicate a limit to increased power capacity on the basis of conventional supercharging alone. Curve B shows the effect of adding intercooling to supercharging to increase per cent of MIP without a corresponding increase in supercharging pressure. Since then a series of tests have been conducted to check his original theories regarding intercooling. Efforts were made to correlate calculated cycle mean temperatures and surface temperatures of internal walls, which obviously affect engine parts and not gas temperatures. An engine of 600 rpm. and another tested at 327 and 360 rpm. were used and accurate equipment was installed to measure heat flow to the cooling water jackets. Means were also available for controlling the temperature of air intake to the blower or engine manifold. Cooling water mean temperature was held at 155 degrees F. and rate of circulation was maintained constant for all loads and speeds.

The formula for rate of heat transmission per-

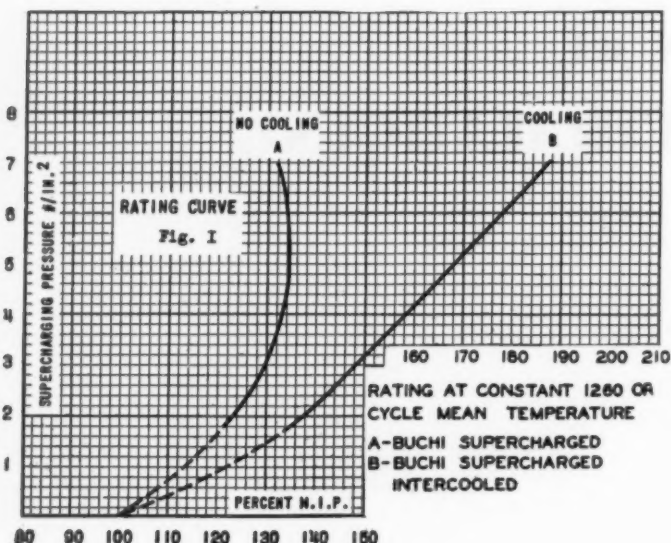
mits the conclusion that the internal wall temperature is unchanged when, in any engine, changes are made in manifold pressure or temperature or combustion efficiency but the load is adjusted so that heat flow to cooling water

remains constant. It follows, then, that the load may be increased without increase of internal wall temperature provided that the rate of heat flow can be controlled by intercooling intake air. Rate of heat flow is plotted

TABLE 1

12 x 14 - Six Cylinder Engine
at 600 R.P.M.

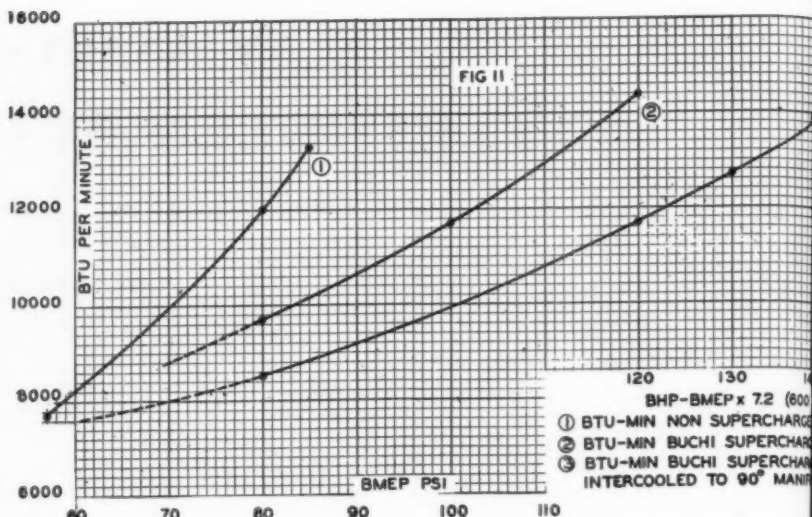
	BUCHI SUPERCHARGED					
	NON-COOLED			INTER-COOLED		
Brake Mean Effective Pressure	80	105	120	120	126	147
Mean Indicated Pressure	100	128	144.5	144.5	151	174
Brake Horsepower	576	756	864	864	907	1060
Indicated Horsepower	720	921	1040	1040	1087	1253
Fuel Consumption per BHP-Hr.	.386	.375	.377	.371	.3705	.376
" " " IHP-Hr.	.309	.313	.313	.308	.308	.317
Total B.T.U. MIN. H.H.V. 19600	72500	92700	106500	104500	110000	130000
B.T.U. to Cooling Water	12000	12300	14500	11700	12300	14500
" " " " % of Total	16.6	13.3	13.6	11.2	11.2	11.15
Brake Thermal Efficiency %	33.7	34.7	34.4	35	35	34.5
Supercharging Pressure	0	3.45	4.2	4.075	4.38	5.75
Air Intake Temperature Gauge	90	140	147	90	90	90
Initial Compression Temperature - T_1	675	671	677	621	619	617.5
Ratio T_m to T_1	1.895	1.91	2	2.06	2.07	2.19
M.I.P. from Fig. VIII & IX	100	127			151	
Total Weight of Air per Minute	101	165	170	164.2	188	200
Weight of Air Per Minute Retained in Cylinder	101	129.5	134	145	148	158.5
Weight of Fuel Per Minute	3.71	4.76	5.46	5.33	5.6	6.65
Lbs. of Air Per Lb. of Fuel	27.2	27.1	24.5	27.2	26.4	23.8
Volume of Air in C.F.M. Total	1395	2210	2270	2460	2510	2675
B.T.U. Removed from Air-Min.				2500	2750	3700
B.T.U. Removed per HP per Min. from air				2.90	3.03	3.5
B.T.U. % of Total Cooling Water + Air	16.6	13.3	13.6	13.6	13.6	14.2



for the 600 rpm. engine in Figure II for three conditions: (1) Non-supercharged; (2) Buchi supercharged; (3) Buchi supercharged intercooled to 90 degrees manifold temperature.

At 4 psi supercharging pressure the BMEP can be increased between 21 and 26 psi at the same heat flow to the cooling water when the supercharging air in the inlet manifold is cooled to

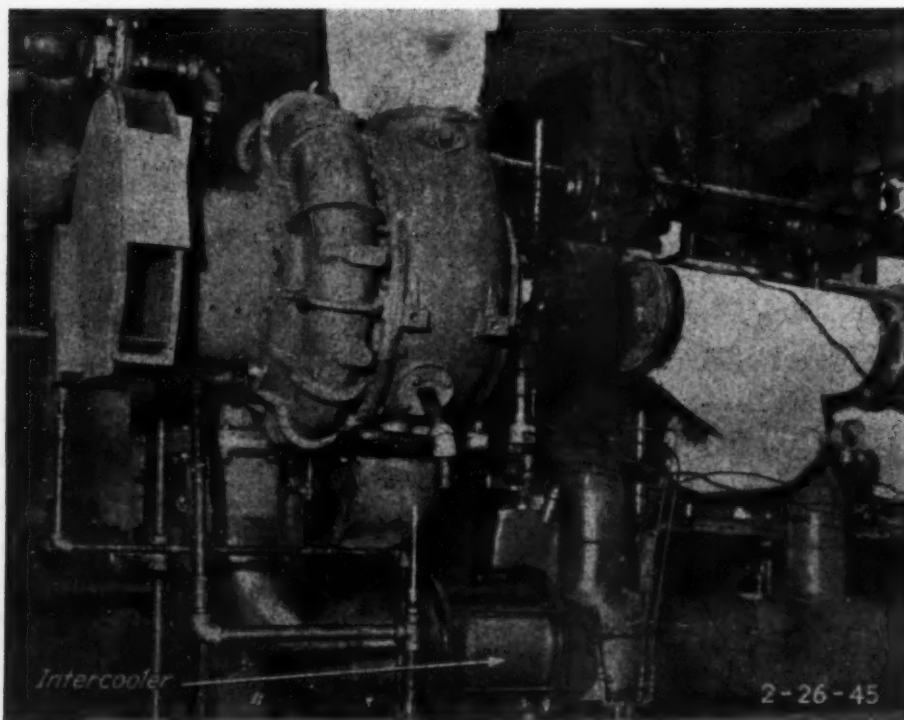
the air temperature at the blower intake. Graphs in Figure VI show manifold temperature versus BMEP of the 600 rpm. engine at two different rates of heat flow to the cooling water, namely, 10,000 and 12,000 Btu. per minute. The author selected a test point at 126 degrees F. manifold temperature and 105 BMEP with a heat flow of 12,000 Btu. per minute and computed a mean cycle temperature of 1262 degrees Abs.



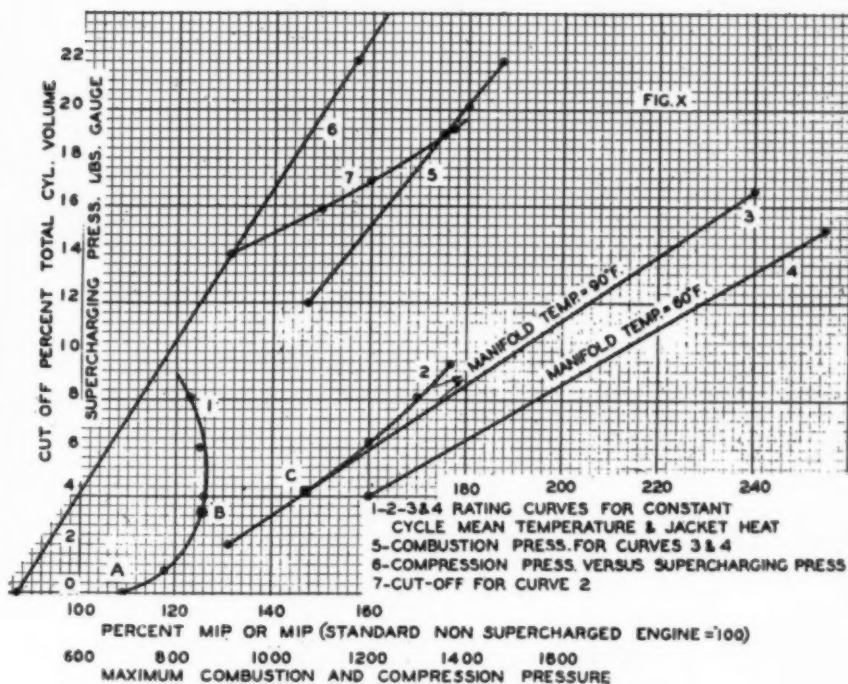
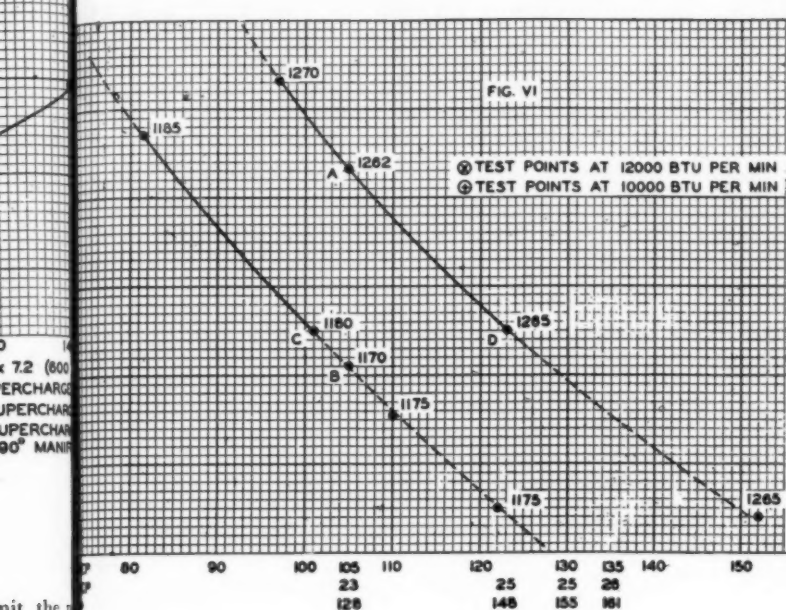
Unfortunately, space does not permit the production of his numerous calculations, which are available to those interested by reference to the original paper (A.S.M.E. 45-A-44). However, they demonstrate that when the air intake temperature is changed, the load may be adjusted along the line of constant calculated cycle mean temperature and that this loading will maintain the internal temperatures at a constant level.

In Figure XI constant cycle temperature lines have been plotted against atmospheric intake temperature and MIP for constant manifold pressures. 90 degrees F. is taken as standard and the point of rating. The effect of intake temperature on load capacity is obvious.

Table I summarizes data from one non-supercharged, two non-cooled supercharged and three intercooled Buchi supercharged tests. Although the theoretical cycle thermal efficiency is affected by the initial compression temperature these tests results show an increase from 34% to 35% brake thermal efficiency when intake air is cooled to 90 degrees at 120 BMEP. Fuel consumption is reduced from 0.377 to 0.357 lbs./bhp./hr. Heat flow to cooling water drops from 14,500 to 11,700 Btu. per minute and the calculated cycle mean temperature from 1365 to 1270 degrees Abs. Of course, where a cooling medium of low temperature is available, such as in cold storage or ice plants, the air cooling may be carried considerably lower than 90 degrees to advantage. Line (4) in Figure X is plotted for 60 degree F. air intake temperature to indicate the as yet unexplored possibilities of increasing four cycle engine output. For instance, with a supercharging pressure

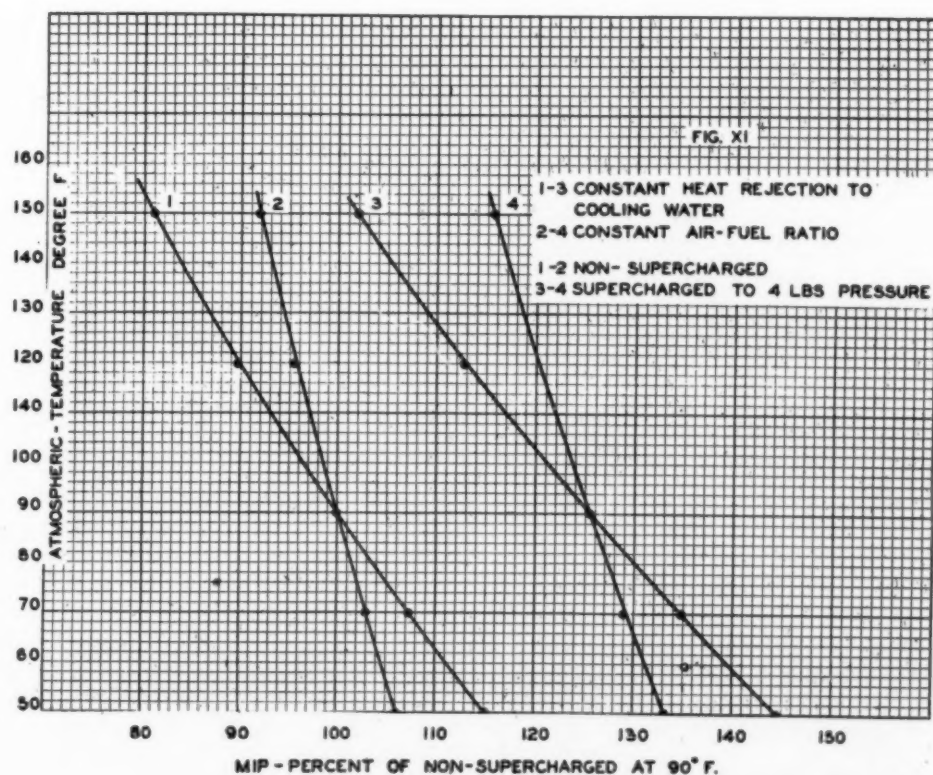


Typical turbocharger installation showing method of fitting intercooler in the system.



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While these figures require some downward
compensation for increased heat transfer due
to increased gas density, they prove conclusively
that high pressure supercharging holds great
future promise.

conclusion, the author summarizes from the
commercial standpoint as follows. On the basis
of constant internal temperatures, the nonair-
cooled Buchi supercharging system permits an
increase of 20 to 28 BMEP for the conventional
engine naturally aspirated. But the cost of this
increase is very nearly in proportion to the gain. By
the simple expedient of adding to the super-
charging equipment an air cooler whose dimen-
sions may be only 15 inches square by 4 feet
long for 2600 cfm and supplying cooling water
at 80 degrees F. to remove 3 Btu/bhp./minute,
the engine output is increased to 155% of
line (4) non-supercharged rating. The cost of such cool-
ing equipment will be about \$3.00 to \$4.00
per horsepower gained by cooling. Operation
and maintenance present no problems. Com-
pared with a non-intercooled turbocharged
engine, intercooling to 90 degrees reduces cost



per horsepower by about 18½%, and the weight
and volume of the engine are correspondingly
reduced about 20% for equivalent power.

(Editor's Note: This paper has been reviewed
prior to the A.S.M.E. closing date for accept-
ing discussion. Hence none is included.)



Since 1943 Coon Rapids has added 1000 hp. to its then installed 1350 hp.

INDUSTRIES in Coon Rapids, Iowa, and a rural electric cooperative demanded so much energy from its municipal Diesel electric plant last year that the per capita consumption for the town, of about 1,500 people, was 2,117 kilowatt hours. That was unusually high for a small community; for a family of four, it meant 8,468 kilowatt hours.

A hybrid seed corn processing plant alone consumed about 18 per cent of the total of 3,175,800 kwh. generated. Other industries, including a produce plant, two feed mills and two hatcheries, brought up the power consumption total to 26 per cent of the amount generated. The REA cooperative used 30 per cent.

The power load, a seasonal one, is at or near its peak for about six weeks in the fall. Even after the addition of a new 1,000 hp., five-cylinder, Diesel engine with generating equipment, supplied in 1944 by Fairbanks, Morse & Co., the plant reserve—about 100 per cent the rest of the year—is greatly reduced for those six weeks.

Eight years ago, Coon Rapids, two hours northwest of Des Moines, replaced a high-line service with the municipal Diesel plant. It installed, at the start, a 225 hp. and a 375 hp. engine, one three-cylinder and the other five-cylinder, with alternators and auxiliary equipment, made by Fairbanks, Morse & Co. A year later it added a 750 hp., six-cylinder Worthington Diesel. The original Diesel plant at Coon Rapids was described in DIESEL PROGRESS, April 1943.

With the latest engine, the Fairbanks-Morse 1,000 hp. unit, the total horsepower of the four units is 2,350 and the rated kilowatt capacity 1,588. Last year's peak load was 1,200 kilowatts.

A Board of Trustees of three members operates the municipal light and power plant, and the water and sewer systems as well, on a fiscal-year

basis, April to March inclusive. As of March 31 last, the electric plant alone represented a valuation of \$269,000, without depreciation. This covered site, building, engines, generating and other equipment, and distribution system.

A bond debt against the plant, original and additions, of \$256,000 had been reduced by pay-offs from earnings amounting to \$85,000. Of the outstanding debt, \$171,000, the plant may call \$119,000 before maturities. So far the board has paid all callables in advance. It figures that if all remaining bonds were callable, the plant could be out of debt in seven years. As it is, with \$52,000 in non-callables, the last group may not be retired until 1956.

The board has picked up, paid, about \$14,000 in water obligation bonds, incurred some time before and some after it took over control of the water department, in 1938. There are now no obligations against the water system. Improvements to water works, which formerly were financed by issue of general obligation bonds, have been cared for by the board itself, since 1938, out of earnings.

There are about \$30,000 bonds outstanding, general obligation, owed by the town of Coon Rapids not the electric plant, for the sewer system. This system is a little more than a year old. Earnings of the electric plant paid about \$1,500 last year toward operating costs of the sewage disposal plant.

The first full fiscal year of operation of the first three Diesels in the light plant was 1939-1940. The score of the plant for that year and the five after it is presented in this table:

Fiscal Year	KWH volume generated	Av. KWH cost delivered to consumer	KWH per gallon of fuel oil	Annual maintenance-repair cost per HP
1939-1940	1,275,000	\$.0145	11.95	\$.32
1941	1,756,800	.0119	12.32	.601
1942	2,253,900	.0122	12.73	1.453
1943	2,483,700	.0113	13.09	.88
1944	2,760,800	.0106	13.39	1.348
1945	3,175,800	.0118	12.90	.90

Cost delivered to consumer is computed on total volume sold, excluding plant use, free services and line losses. Line loss is heavier than normal for a town of the size, owing to large trans-

COON RAPIDS, IOWA, EXPANDS CAP.

By T. J. MALONE

former capacity necessary to care for the power load. This points to the hybrid, produce and other plants. Line loss averages about one-tenth of volume generated yearly.

Unit cost, delivered, takes into consideration generation, distribution and administration costs and excludes interest, depreciation and payments on principal. The increases in 1941-42 and 1944-45 reflect wage boosts. Sale price excludes the REA cooperative as "wholesale." The power share of the 1944-45 energy volume was 835,244 kilowatt hours, a gain of nearly 40 per cent over the year before. The 1,000 hp. Diesel began operation in September, 1944.

Fuel return averages include REA. Maintenance and repair averages include oils and material costs but no allocation for labor. Labor is considered as nominal, for the work is done by the plant force while attending to all other duties as well. The 1944-1945 average leaves out the new engine. The yearly per horsepower average for the six years is 91.7 cents.

What free services does the board give? Electricity and water are furnished free to city hall, library, swimming pool and parks. For street lighting the town council provides \$60 a month from tax levy and the board absorbs any excess cost over that. Last year the excess was \$695. The board contributes all electricity used by the sewer system. The public library rents out its kitchen and dining room facilities and is permitted to keep the charges for itself. Then there is the honor roll board listing names of men and women in the armed services. It is floodlighted, and electrical equipment, current and labor are contributed.

In pre-war days current was free for special ornamental street lighting in the Christmas season. For several years, before the war, anyone doing outdoor ornamental lighting, whether in home or in business, received the same bill for December as for the month before. This concession proved highly popular. The board foresaw that many consumers would use extra kilowatt hours for other purposes than Christmas lighting, and encouraged such use. Result: a marked upping of monthly consumption there-

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after. Liberal use of current taught the users they couldn't go back to their old averages.

A comparison of November and December bills, residential, for two prewar years shows:

	November	December
1940	25,864 kwh.	35,347
1941	28,794	43,878

Up to the time the electric plant retired from marketing electric stoves, leaving that to local dealers, it provided every year a new model stove to the domestic science room in the high school. Good salesmanship! For who, that has ever cooked with an electric stove would, from choice, ever after use any other? It is rumored that girls in Coon Rapids tell their boy friends they'd rather have an electric stove than a diamond ring.

Consumer rates have held the same from the beginning of the municipal plant. The residence lighting rate begins at 7 cents for the first 30 kilowatt hours, drops to 6 cents for the next 30, to 3½ cents for the next 40 and to 2¼ cents for excess. This optional rate has a minimum charge of \$3.00 a month.

In the commercial lighting schedule, 7 cents is the top rate, for the first 60 kwh. It then drops to 5 cents for the next 120, to 3 cents for the next 1,320 and to 2¼ cents for excess.

Power rates begin at 5 cents for the first 100 kwh., drop to 3 cents for the next 900, to 2½ cents for the next 4,000 to 2 cents for the next 5,000 and to 1½ cents for excess. The heavy power load at low cost to consumers brings down the annual operating income below that normal for the plant's kilowatt-hour volume.

Drastic variation in power demand by the hybrid seed corn industry explains why the electric plant, with a 100 per cent reserve most of the year, has a markedly depleted reserve during a short period. The "Hybrid's" rush season lasts about six weeks, with the peak in October. In October, 1944, its power equipment—dryers, treating machinery, conveyors—required 392,100 kilowatt hours of energy as compared with 79,200 in the November follow-

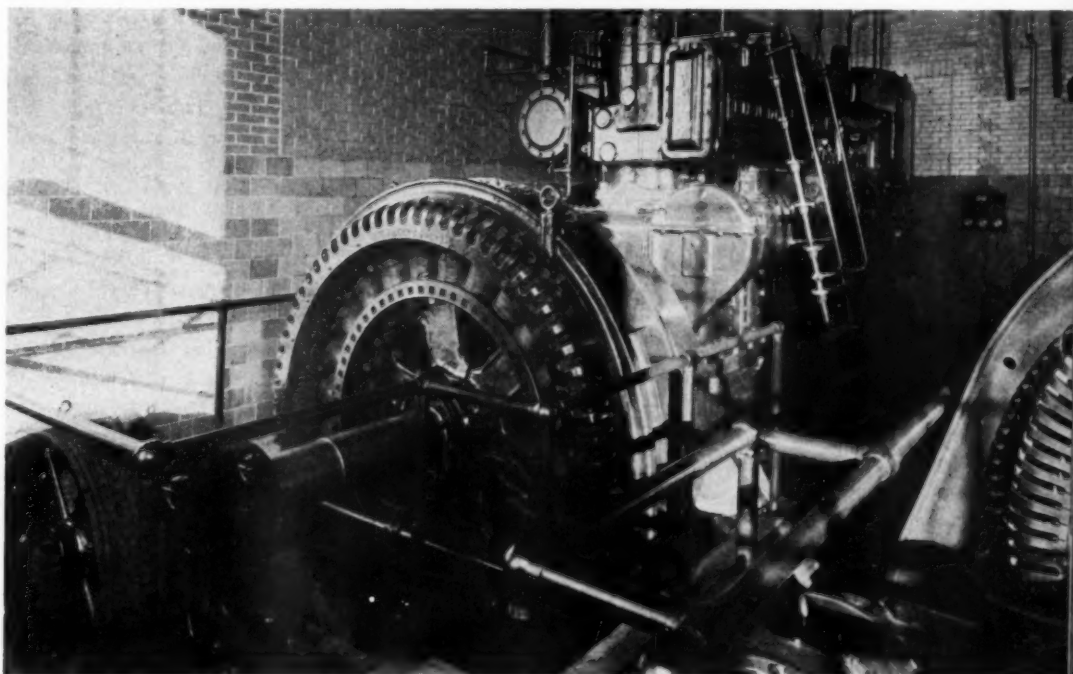
ing. Its average for the four high months in the fall was 131,975 kwh. monthly, as against a monthly average of 4,200 for the other eight months of the fiscal year.

Three of the generators are F-M, the other being a 625 kva. Electric Machinery alternator. All engines are Woodward governed. The switchboard is G.E. with G.E. Diactor regulators. Water pumps are four F-M centrifugals and a Diesel Service steel, forced-draft cooling tower handles cooling for all engines. Exhaust silencers are Maxim and intakes are protected by American air filters. Alnor exhaust pyrometers are fitted for routine checking of the

performance of each cylinder.

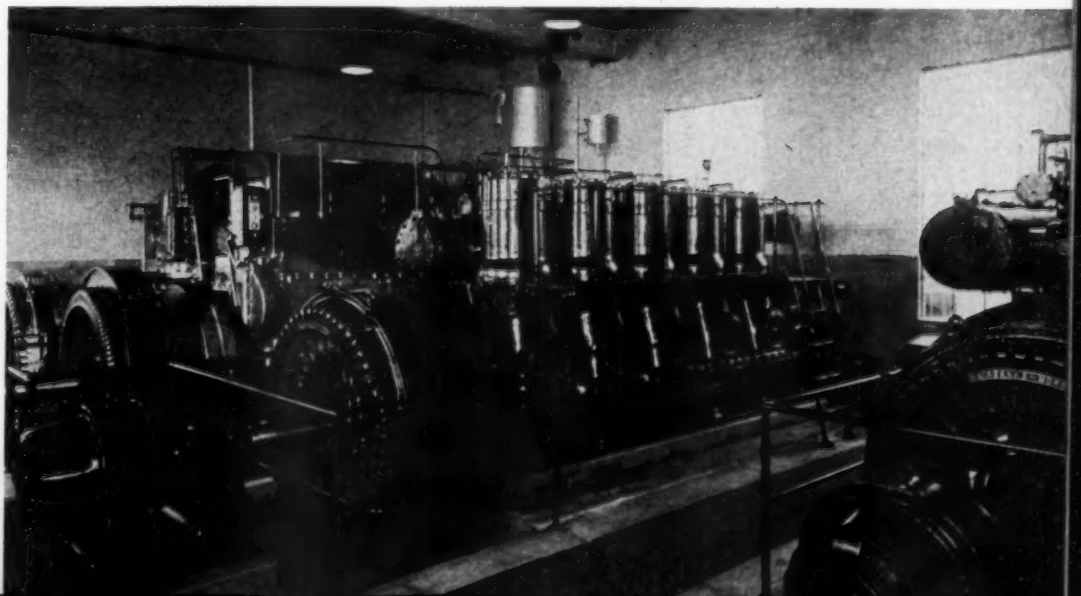
Members of the Board of Trustees are C. H. Whitten, Chairman, O. A. Kretzinger and J. W. Miller. Messrs. Whitten and Kretzinger have served from the beginning of the plant. M. R. Wait has been superintendent since October, 1938, and is secretary of the board.

Coon Rapids, first settled in the early 1860's, is on the Middle Raccoon River and owes its name to rapids in that stream some miles out. The town is said to have really got its start when the Chicago, Milwaukee, St. Paul & Pacific Railroad went through in 1881.



The 1000 hp. F-M Diesel and generator added last year.

Second unit from far end is the 750 hp. Worthington Diesel and Electric Machinery generator—other three units are F-M Diesels and generators.



PRINCESSES PAT AND ANNE ALL-STEEL DIESEL TUNA CLIPPERS

By FRED M. BURT

PRINCESS PAT, the first of two, identical, all-steel tuna clippers built by Consolidated Steel Corp. Boat Division, in its 21 acre Newport (Calif.), boat yard, for Otto C. Kiessig & Associates of San Diego, went into service in mid-1945 and her sister ship, *Princess Anne*, followed shortly after.

Princess Pat, under contract to the Sun Harbor Packing Company and skippered by Manuel Gonsalves, also part owner, was the first tuna boat to return from the Galapagos fishing grounds, since the lifting of wartime restrictions; returning with a catch of 200 tons of 2-pole tuna caught in six days.

These boats of 99-ft. length, 25-ft. beam and 13-ft. 9-in. depth amidships, will carry more tons of fish per foot of length than any other boats of this type. The fire-proof, all-steel hulls are 20 per cent lighter than wooden vessels of the same size. Propulsion engine is an Enterprise Diesel of 600 hp. at 400 rpm., with 12 in. bore and 15 in. stroke. The *Princess Pat* turned up an average speed of 11.1 knots over a measured mile on her sea-trial.

The six cylinder, direct reversible, 4 cycle, Elliott-Buchi turbocharged Enterprise Diesel is directly connected to a 5½-in. propeller shaft which is rubber-covered between liners, and runs in a Goodrich Cutless bearing at the aft end of the stern tube.

The preliminary design of the boats is that of Mr. Kiessig and naval architect O. Tellefsen, with the final designs and working drawings made by Consolidated. The four section, forged steel stern frame was constructed in Consolidated's Maywood shops, where rather unusual structural weldments were designed and fabricated, to replace castings generally used in deck and hull fittings. The welded steel construction was continued into the hull, main deck bulkheads, raised deck sides and bait tank, while the deck houses are of wood, with plywood sheathing.

For extended cruises, Diesel oil may be carried in the forward fish well; normally carried in the lower forepeak, the double bottom, and in the wing tanks aft of fish holds. A new design feature is the addition at the after end of 18-ton salt water capacity, ballast wing tanks. These

are filled to hold down the stern, when it starts to rise unduly from the buoyancy created as the fish holds fill and fuel oil is consumed. If the stern is allowed to rise so that the bulwark rail aft is more than 34-in. above the water, it becomes mighty tough work to whip heavy tuna over the shoulder onto the deck. There aren't any rest periods for hours at a time, for you catch 'em, where and when you find 'em. After the catch is complete, these ballast tanks are pumped dry to bring the stern up to about 39-in. for the speedy run home.

The inner tank, fish holds are made of ¼-in. steel plate with transverse bulkheads, and are kept from touching the outer steel plating by ½-in. Douglas Fir framing strips, pre-treated with Cuprinol paint. This space is filled with Johns-Manville fireproof insulation and the holds were tested for tightness with compressed air.

Two 75-kw., 240-v., A.C. Caterpillar Diesel electric generating units with gasoline engine starting, provide auxiliary power. They are completely self-contained units and are located, port and starboard, on each side of the main engine. Exhaust gases from all engines pass out through Kittell spark arresters, with silencers on the auxiliaries and gases passing through Bendix-Eclipse flexible pipe from the auxiliaries to their arrester-silencers. Main engine gases passing through the Elliott Buchi supercharger does not require the use of a silencer. Starting air for the main engine, at 250-psi. is supplied by

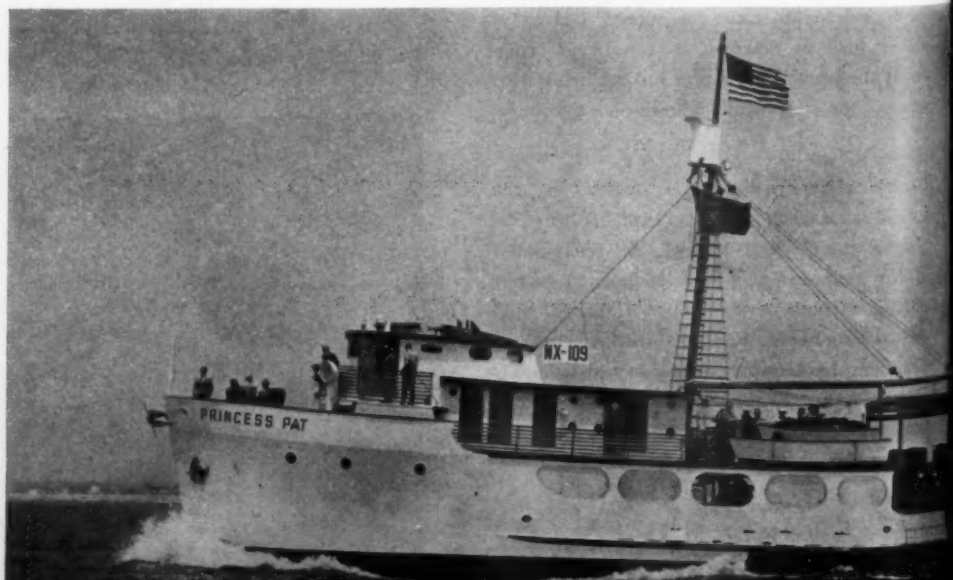
an Ingersoll-Rand, motor-driven compressor, with air for maneuvering provided by power taken off the main engine with a belt.

A 720-gal. lubricating oil storage capacity is provided in tanks separated from the hull; the transfer pump is Fairbanks-Morse. Engine driven pumps circulate oil from the engine sump through a Luber-finer filter to the supply tank and it returns through a Ross cooler. A 10-gpm. pre-lube Deming hand pump can be used to insure pressure on all lines before the engine is started. Shell Diesel marine lube is used. Fuel oil is drawn from the tanks through Purolator strainers for delivery to a 116-gal. day tank with an engine driven fuel pump. It is gravity-supplied through duplex strainers to the pressure pump, then through a Winslow filter to the high pressure pump and headers.

In the upper engine room, the Johnson gear is operated by a Sperry electro-mechanical steering unit, through a chain and sprocket system. The complete, automatic Sperry steering system installed in the pilot house includes a Sperry Mark 18 gyro-compass, 5-hp. D.C. motor generator, combined automatic and hand steering stand, and compass repeater. The straight line wake provided by this automatic equipment, as compared with hand-steering, on the sea trial run was amazing, as such a short, deep draft vessel is difficult to steer in a beam sea.

Ets-Hokin & Galvan power and lighting switchboards are used, with 60-cycle, 200 v. A.C. cur-

"Princess Pat," 99½ ft. Clipper makes 11.1 knots on trials. Engine is 600 hp. Enterprise, Elliott-Buchi turbocharged Diesel.

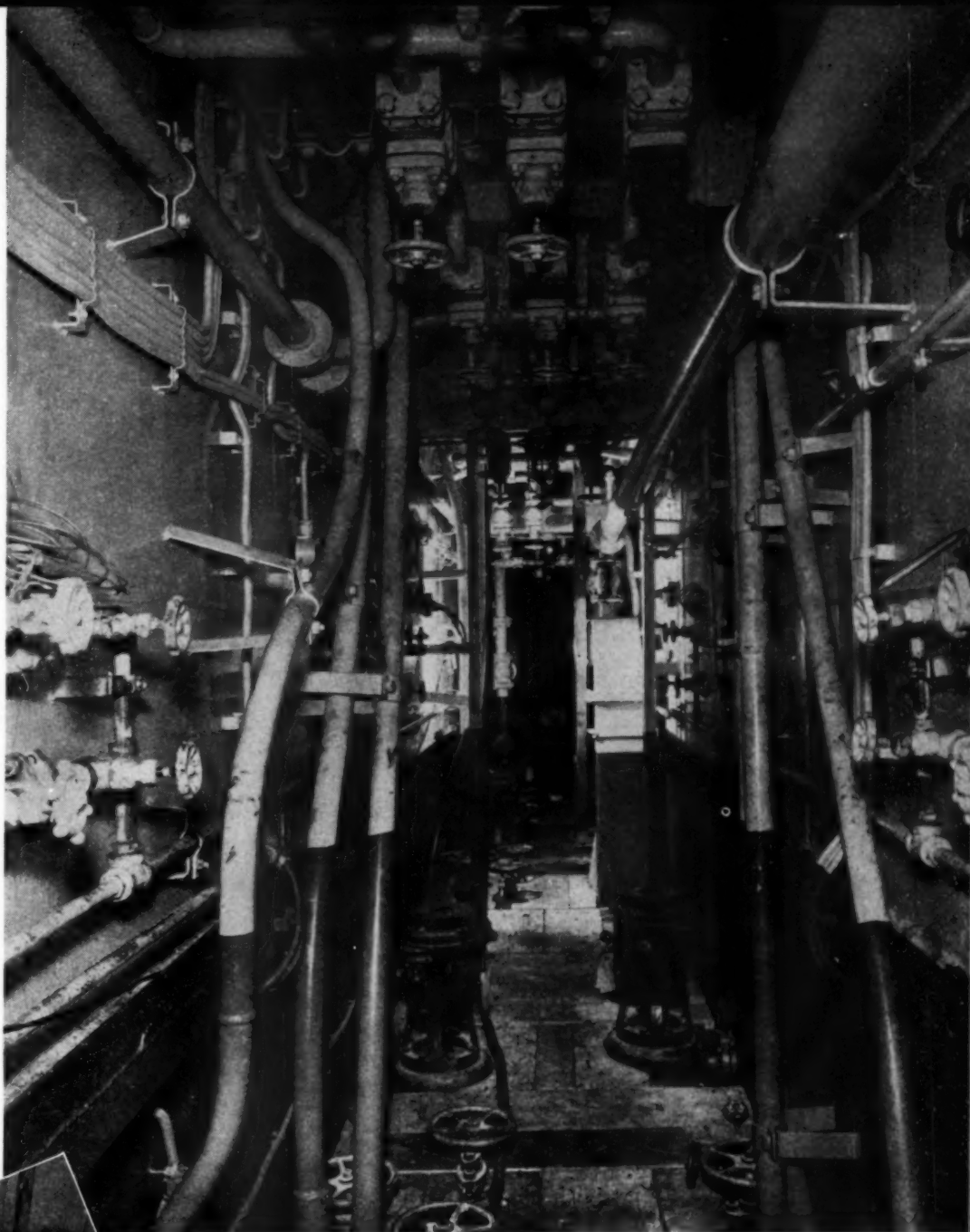


rent used for power and 60-cycle, 110 v. A.C. for lights. The same firm also installed the submerged lights in all bait-carrying compartments, and the CO₂ fire-extinguishing equipment.

The complete brine refrigeration system, supplied and installed by the Baker Ice Machine Co. consists of four ammonia compressors, of 4-cyl. 3½ in. x 3½ in., belt-driven by 15 hp. Fairbanks-Morse motors, located in the upper engine room. Water for the cooling of the condenser and compressors is provided by a 300-gpm. Fairbanks-Morse pump.

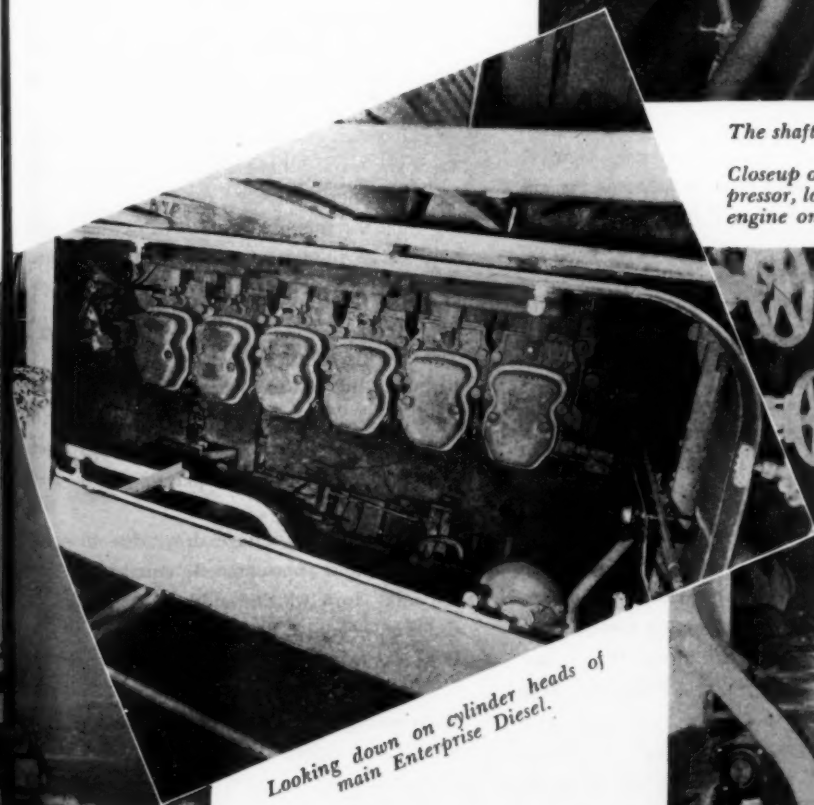
In the pump room recess there is one, main brine centrifugal transfer pump of 5 hp. 300 gpm., and there are ten 2-hp. centrifugal 220-gpm. brine circulating pumps in the system, all Fairbanks-Morse. Two other Fairbanks pumps of 15 hp. 2800 gpm., each with full capacity for the job, supply the bait water system, which supplies a constant change of water to Nos. 2 and 3 fish holds and the bait tank on deck. Overflow valves allow a constant discharge of water.

Under construction at Consolidated's Newport Yard last October, were four other all-steel, Diesel tuna clippers—the *Lou Jean*, being built for Agostino Guidi of San Diego; the *Terra Fatima*, for Joe F. Rosa; *American Boy* for Joaquim Canas; and the *Conte Bianco*, for Andrea Castagnola.

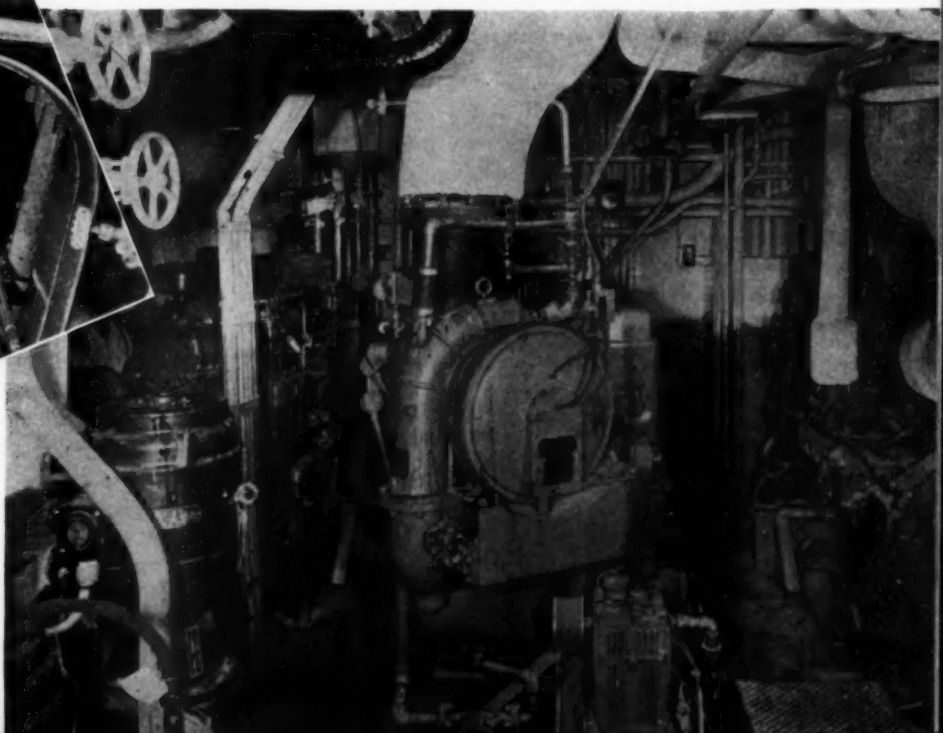


The shaft alley, looking aft, is lined with piping, valves, pumps and electric wiring.

Closeup of Elliott-Buchi turbosupercharger on aft end of main engine with Quincy compressor, lower foreground. Caterpillar Diesel auxiliary units are seen flanking main engine on either side.



Looking down on cylinder heads of main Enterprise Diesel.



STARTING MOTORS ON SMALL GENERATING PLANTS

By G. L. OSCARSON*

WHenever a sizable load is thrown on a generating plant of limited capacity, the voltage tends to drop momentarily until it can be restored by the voltage regulator. This momentary voltage drop is called a "voltage dip." Voltage dips may be objectionable, depending upon their amplitude and frequency. Frequent flickering of lights, for example, is usually objectionable, and severe voltage dip may affect other equipment on the line.

The common cause of voltage dip in relatively small generating plants is the high KVA etc., etc. as per the enclosed article.

I. Causes of Voltage Dips

The common cause of voltage dip in relatively small generating plants is the high kva at low power factor required in starting induction motors. This article deals mainly with that aspect, and gives a convenient table of the permissible horsepower that can be started on a generator without exceeding specified voltage dips. The effect of a-c welding transformers, or resistance loads may also be determined quite closely by use of the curve in Fig. 2.

II. Effect of Voltage Dips

Voltage dip is important, first from its effect on quality of illumination, and second the effect on motors, either in operation or being started. Such matters as operation of x-ray machines or other critical devices require special study and cannot be covered by a general article.

III. Permissible Voltage Change

Good lighting concerns itself with both the

* Chief Application Engineer, Electric Machinery Mfg Company.

frequency and amount of voltage variation. Where good quality lighting is desired the following conditions are acceptable:

Frequency of Flicker	Permissible Percentage Voltage Variation
20 to 5 times per second	1½
5 or less times per second	2½
Infrequently	5

A voltage dip of more than 5% will always be objectionable from a lighting standpoint regardless of how infrequently it occurs. In some cases it may be tolerated as a matter of expediency. The size and type of lamp, and whether the illumination is direct or indirect are also factors affecting acceptable voltage dip. However, the above figures may be taken to represent average values.

For motor operation it may be considered that a voltage drop of 10% is acceptable. General-purpose motors usually have sufficient margin, if application is properly made, so they will continue to operate, even with constant torque load, at 90% of nameplate voltage. They will likewise start and accelerate their load if line voltage is maintained within 10% of normal.

Where quality of lighting is not important, 10% voltage dip may be tolerated at relatively infrequent intervals.

Where quality of lighting may be disregarded entirely and where nature of load is such that torques are adequate, voltage dips as great as 25% may be tolerated in starting motors. It is usually not desirable to go beyond that as line contactors and undervoltage releases may drop out below that point.

IV. Factors Affecting Voltage Change

Many factors of generator and exciter design, initial load and power factor, and voltage regulator operation enter into the determination of voltage drop when any specific load is added. Since some of these factors vary from time to time, or are difficult to determine, certain assumptions must be made in any general study of this problem. Moderate initial loads, especially if power factor is not above 0.8, will minimize voltage dips.

Certain assumptions have been made as follows:

- 1—That the starting power factor of motor (except slip-ring type) is 0.2 to 0.4,
- 2—That the generator rating is 0.8 power factor and 40% regulation,
- 3—That the initial instantaneous voltage drop (see Fig. 1) is approximately 50% of the unregulated (fixed excitation) drop,
- 4—That the total voltage drop (see Fig. 1) is approximately 60% of unregulated (fixed excitation) drop,
- 5—That the generator has some initial load, say 25% of full load, and power factor of this load is not above 0.9,
- 6—That the original load in kva plus added starting kva does not exceed 150% of generator capacity,
- 7—That a quick-acting voltage regulator is used,
- 8—That for induction motors or 0.8 power factor synchronous motors we assume 1 hp. = 1 kva running load,
- 9—That for unity power factor synchronous motors we assume 1 hp. = .85 kva running load.
- 10—That the generator and exciter characteristics are normal for relatively small, medium and high speed units.
- 11—That the engine has sufficient flywheel effect so that the voltage regulator has time to function before speed drop becomes appreciable.

V. Nature of Voltage Drop

Fig. 1 illustrates what takes place when a load equal to 72% of generator full-load capacity, and at 0.2 power factor, is switched onto a generator with the generator operating at no load.

An instantaneous voltage drop, due to stator reactance, and approximately equal to 50% of the total drop which would take place if excitation remained fixed, takes place. This is indicated by A - B.

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the excitation remaining fixed at full-voltage, open-circuit value, the voltage then declines to the point E and becomes stable at that point as long as the load is unchanged. This drop is due to the demagnetizing effect of the generator armature ampere-turns on the field.

If a quick-acting regulator is used, field excitation voltage is increased and the generator voltage starts to increase at point C, where effect of the increased excitation voltage has overcome the demagnetizing effect of the armature. This point is usually reached in one-half second or slightly less. The maximum regulated drop (to point C) is usually about 60% of the unregulated (fixed excitation) value. If the ceiling voltage of the exciter, and the generator capacity are adequate, voltage will generally be back to normal in about 1 to 2 sec.

VI. Added Load vs. Voltage Drop

On the basis of the assumptions in paragraph IV, and the typical voltage-drop characteristics illustrated in Fig. 1 a voltage-drop curve, Fig. 2, has been prepared. This curve shows the voltage drop which occurs when a low power factor load, such as an induction motor, is switched on to a generator. For convenience in determining permissible motor sizes for specified voltage drops, information from the curve Fig. 2 has been prepared in tabular form shown on the next page.

VII. Starting KVA of Various Types of Motors

Starting kva of various types of motors is approximately as follows:

Type	Starting kva. in % of Full-Load kva.
2-pole squirrel-cage or synchronous motors	900
General-purpose squirrel-cage motors	650
High-speed synchronous motors	550
Low starting kva. squirrel-cage motors	400
Elevator motors	300
Low-speed synchronous motors (low torque)	100
Slip ring motors	100

We have assumed that, for induction motors or 0.8 leading power factor synchronous motors, one hp. of motor nameplate rating equals one kva. of motor input. Thus a 10 hp., 1200 rpm. squirrel-cage motor may be assumed to have a full-load kva. of 10 and a starting kva. on full voltage of 65.

VIII. Starters

The usual starter for squirrel-cage or synchronous motors is a full-voltage, or so-called across-the-line, magnetic controller.

Where reduced starting kva is desired, a reduced-voltage (compensator) type control is generally used, either manual or automatic. With this type of control, torque and starting kva. are both proportional to the square of the

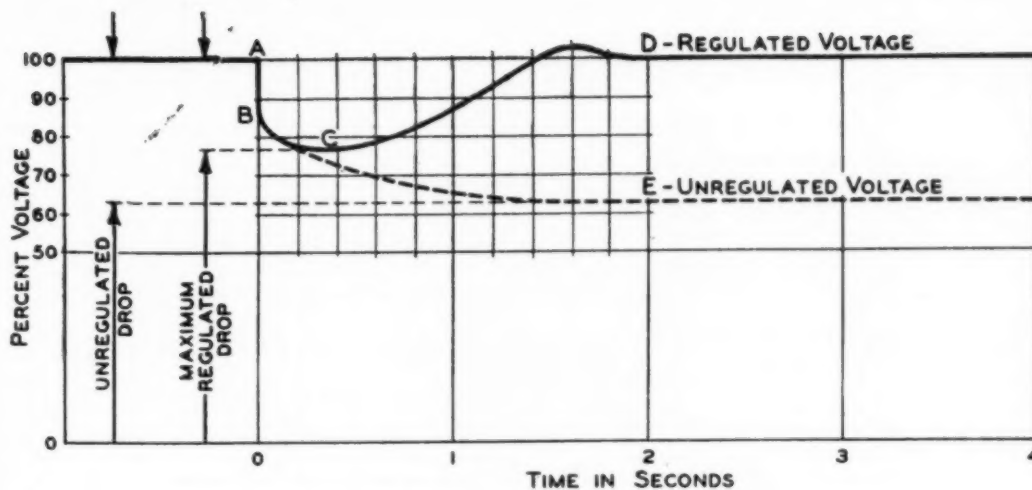


FIG. 1 - Curves above illustrate the characteristics of a typical voltage dip when a substantial load is switched onto a generator, with and without a voltage regulator.

applied voltage. Before applying such a control the required starting torque must be checked to be sure that sufficient torque is available on reduced voltage to start the load. For instance starting on the 80% tap results in only 64% of the full-voltage kva. and torque.

Where smooth, stepless starting is desired a compression-type resistor starter is sometimes used. Starting torque is reduced much faster than starting kva. If the kva. is reduced to 64% of the full voltage value the torque is reduced to 41% of full voltage value. However starting resistance may be completely shorted out if necessary in practically stepless increments. If the generator has sufficient capacity to maintain full voltage under that condition.

full-voltage torque may be reached without objectionable voltage dip.

Slip-ring motors are usually started on full voltage with all secondary resistance in the circuit. The secondary resistance is then cut out in successive steps as the motor comes up to speed.

IX. Motor Starting Table

The following table covers motor ratings that can be started with specified voltage change conditions. Ratings are on basis of motor hp. in per cent of generator kva. capacity.

A. 2½% voltage drop due to motor starting is not usually objectionable regardless of how often it occurs. It is therefore suitable for motor

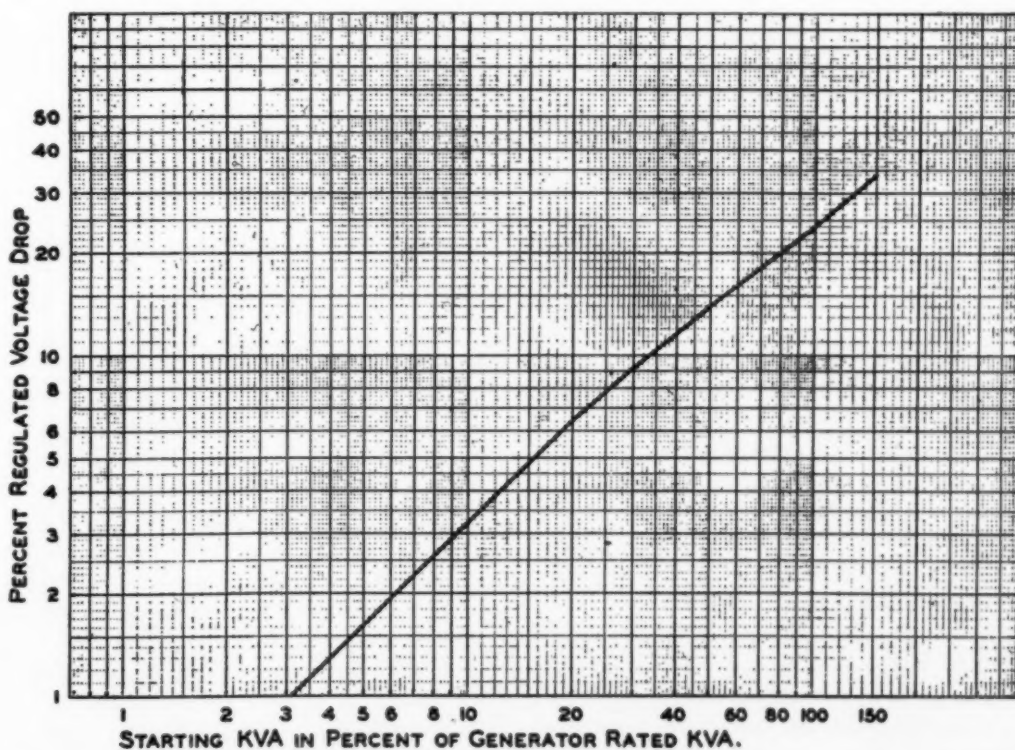


FIG. 2 - Curves showing the percent voltage drop (on a generator using a voltage regulator) that can be expected when a low power factor load, such as starting an induction motor, is added to the generator.

EXAMPLE: An induction motor whose starting kva is 10% of the generator rated kva is switched on to the generator. What is the resulting percent voltage drop? Referring to the curve, the intersection of the ordinate for 10% starting kva and the curve shows 3.2% voltage dip.

MOTOR STARTING ON SMALL GENERATING PLANTS

Permissible horsepower in percent of generator kva based
on various types of starters and specified voltage drops.

REGULATED VOLTAGE DROP		A 2½%				B 5%				C 10%				D 25%			
TYPE OF STARTING		F. V.	COMPEN- SATOR		RES.	F. V.	COMPEN- SATOR		RES.	F. V.	COMPEN- SATOR		RES.	F. V.	COMPEN- SATOR		RES.
TYPE OF MOTOR	% KVA		80%	65%			80%	65%			80%	65%			80%	65%	
3600 RPM SQUIRREL CAGE or SYNCHRONOUS ①	900	1	1½	2	16	1½	2½	4½	19	3½	5½	8½	22	11½	17½	27	28
GENERAL PURPOSE SQUIRREL CAGE	650	1½	2	3	23	2½	4	6	27	5	8	12	31	15	24	37	38
LOW KVA SQUIRREL CAGE or HIGH SPEED SYNCHRONOUS ①	550	1½	2½	3½	27	3	4½	7	31	6	9½	14	36	18	29	44	45
ELEVATOR MOTORS	400	2				4				8½							
LOW SPEED SYNCHRONOUS (LOW TORQUE) ①	300	2½	4½	6½	50	5½	8½	12½	56	11	17	26	67	34	53	80	83
SLIP RING	100	8				16				35				100			

1. These figures are for 0.8 power factor synchronous motors - multiply by 1.2 for unity power factor synchronous motors.
2. Motor torque available on the reduced voltage, taking the generator voltage drop into account, must be sufficient to start and accelerate the load. It is not desirable to transfer from reduced to full voltage until motor is at about 75% speed.
3. It is assumed that the motor might not start until all starting resistance is shorted out. This is compression type resistor.
4. Figures indicate starting kva in percent of running kva. Where actual values are known to be different, modify permissible horsepower on a pro rata basis.

starting or a-c welding transformer duty regardless of frequency of disturbance. These values should be used where extremely good quality of lighting is required.

B. 5% changes are not objectionable at infrequent intervals, perhaps one per hour or less.

C. The figures for 10% change may be used where motors are started quite infrequently and a substantial lowering in light intensity can be tolerated. General purpose motors would usually start and operate under full-load conditions with this change of voltage.

D. A 25% change can be tolerated perhaps once or twice a day. Fluorescent lights would go out completely and incandescent lights practically so. There might be difficulty in starting high inertia or constant torque loads, and

motors operating on constant torque loads might stall. A survey of electrical devices and loads should be made to determine that they would not be adversely affected.

X. Close-regulation Generators

In cases where it is obvious that the voltage dip will be objectionable if standard 40% regulation generator is used it may be possible to eliminate the objections by using better than standard regulation generators. Standard regulation is 40% and the curves and charts in this article are based on that value. However, for a 20% regulation generator the corresponding voltage dip will be approximately 50% of that shown on the curve and the motor sizes may be twice those shown in the table. In effect, using the closer regulation generator is the same as applying an oversize generator to the engine. However, the kw. capacity will be matched to the

engine horsepower rather than having the generator nameplate rating larger than justified by the engine horsepower.

XI. Constant Voltage Transformers

In some cases where a relatively small amount of lighting capacity is required it may be impracticable to base the generator capacity on a small enough voltage dip to prevent undue flicker in the lights. Also sometimes extremely close voltage regulation is required for x-ray machines or other devices. In such cases it may be found advisable to permit the voltage dip to reach fairly high values but to install a voltage stabilizer or constant voltage transformer ahead of the lighting circuit. Such a device will frequently eliminate the objection that starting of certain motors results in undesirable lighting conditions.



Scenes in Lowell, Vermont. This Caterpillar Diesel tractor keeps streets and back roads open in winter and is used on street maintenance in summer months.

→
Heavy going means nothing to this Caterpillar Diesel with a LaPlant-Choate 14 ft. plow widening a drifted road near Steamboat Springs, Colorado. Elevation here is 8000 ft. and temperature goes to 40 below.

LOW-COST SNOW REMOVAL WITH DIESELS



Another Colorado scene, near Kiowa showing Caterpillar Diesel tractor with motor grader and V-type plow opening the roads to traffic after heavy snow-fall. Under these conditions tractors use about 3 gallons of fuel per hour.

DIESEL CLIPPER, "CHICKEN OF THE SEA"

By CHARLES F. A. MANN

PRACTICALLY every housewife in America has learned the delights of "Chicken of the Sea" brand canned Albacore (White) tuna. Practically billions of tuna sandwiches have lined the nations' stomachs since Van Camp Seafood Co. of San Diego started educating this country to the use of white tuna, carefully prepared by cleaning, pre-cooking, then packing in salad oil into small tins for a market now practically coincident with the white race around the globe. Van Camp Seafood people have long been associated with the Morgan family of fishermen, and several thousand tons of tuna have been supplied by Morgan boats for Van Camp.

The first, and at that time a daringly large innovation in tuna clippers was the original *Chicken of the Sea* built of wood, about 113 ft. long and powered with a 500 hp. Diesel, large for back in 1930 when a 113 ft. tuna clipper made headlines. The war deprived Captain Harold Morgan Sr. of the original *Chicken*. He long dreamed of a newer and larger *Chicken*, and finally, teaming up with Al Davies and his Birchfield Boiler & Shipbuilding Corp. at Tacoma, late in 1944, laid the keel for what was at that time the largest tuna clipper; the first all-welded tuna or any other type large fishing vessel, and until others started out to catch up with the progressive and somewhat bold Captain Morgan late in 1945, the new 142 ft. *Chicken* actually was the largest tuna clipper afloat.

The handsome, new ship was finally finished and put through a series of exacting, lengthy tests, and sailed for the Middle America country about the middle of October. Registered at Astoria, Oregon, the new ship and its proud owners—Captains Harold Morgan Sr. and Harold Morgan Jr., plus Walker Morgan and Melvin Morgan, by a nice coincidence, caught up with the 1930 *Chicken of the Sea* at Astoria, where the Government had brought her to be sold as surplus. Built on the usual share plan, Van Camp Seafoods holds a substantial interest

in the new ship, which represents nearly \$500,000 investment—the heaviest investment in a tuna clipper yet recorded.

The Diesel power plants in tuna clippers, like the hulls, grow bigger, faster and more elaborate with each passing year. The original *Chicken* startled conservatives 15 years ago with a 500 hp. job. The new ship carries not only a 1500 hp. supercharged Enterprise main Diesel, but two 265 hp. Enterprise auxiliaries, plus a 53 hp. Caterpillar Diesel auxiliary power plant, so the entire ship, almost 100% Diesel-electric in its operation, can be started from cold, with all circuits dead, air tanks empty and water supply down, by merely starting the Caterpillar unit, then the big main auxiliaries, then the pumps and refrigeration motors, and air compressor, then the main engine itself, a cycle requiring about 2 hours to work through. So, the tuna clipper made famous by the movies and the writing people, now evolves into a 2100 hp. ocean liner with the grace of a yacht, the speed of a passenger vessel and the capacity of two of the predecessor ships—all in just 15 years of evolution.

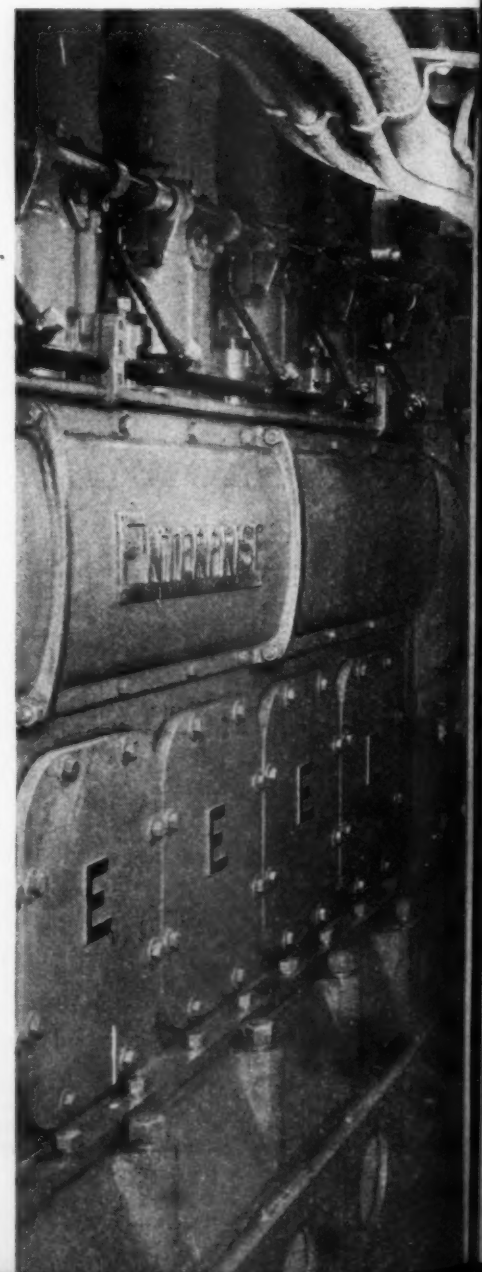
Captain Morgan and his oldest son have incorporated everything into the new *Chicken* that experience has taught and progress in Diesel has brought about. Huge added fuel capacity is obtained by double bottom construction.

Weight reduction, hull rigidity and tight tank seams have been achieved by a 100% electric welded construction job. It is noteworthy to observe that the home port of "wood & Diesel" fishing vessels, Tacoma, Washington, is likewise the home of the first large all-welded steel tuna clipper built in the Northwest from the keel to the coffee percolator, right beside 11 wood and Diesel boatyards in the Forest Capitol of the Northwest. President T. A. (Al) Davies, of Birchfield, also modestly points to the fact that *Chicken of the Sea* carries another lucky "first"—it is the largest commercial vessel built for private account in Tacoma since the South-

ern Pacific steamer *Bienville* was completed at old Todd's shipyard in 1923.

Following a refined end-product in design, peculiar to the tuna vessel alone, the new ship carries the machinery far forward in a hull flared out to almost barge proportions. The main deck, when loaded, is scarcely above the water line. The main deck is really an extension aft of the upper (3rd level) of the engine room, a combination machinery flat and machine shop. Aft of this is the large galley and midships access to the tuna tanks below, followed by the 3-compartment welded steel bait tanks aft. All crews quarters are on the upper deck and are provided with a wide, sheltered passageway on both sides and the pilot house is atop this area, followed by the low, squat, streamlined stack. The crow's nest is atop the pilot house, to improve visibility. All deck-housing, as well as the hull, is of welded steel construction, lined with Southern Ash trim.

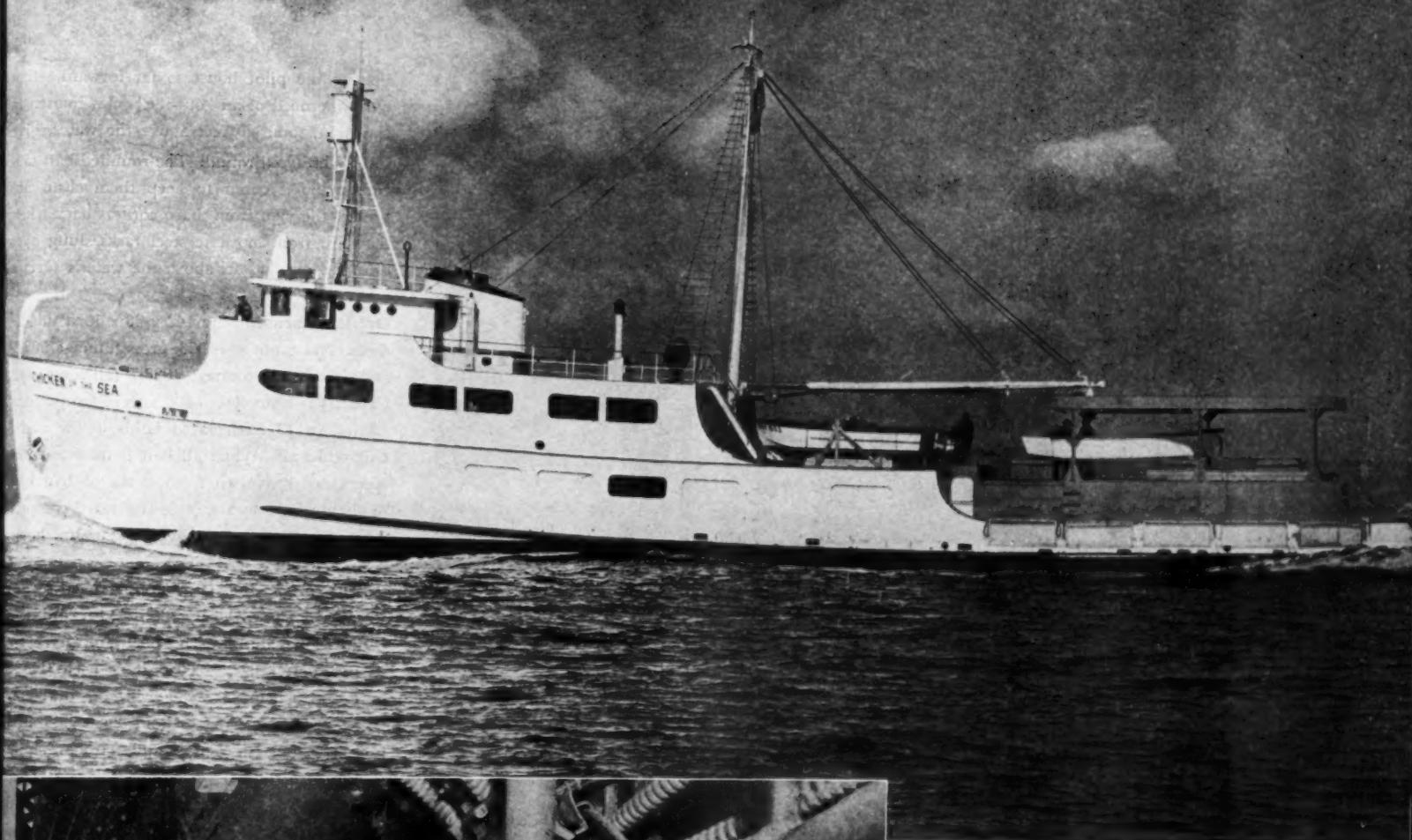
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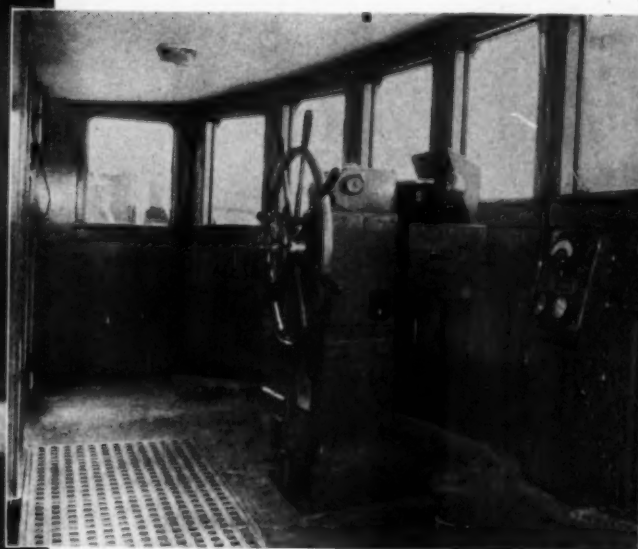
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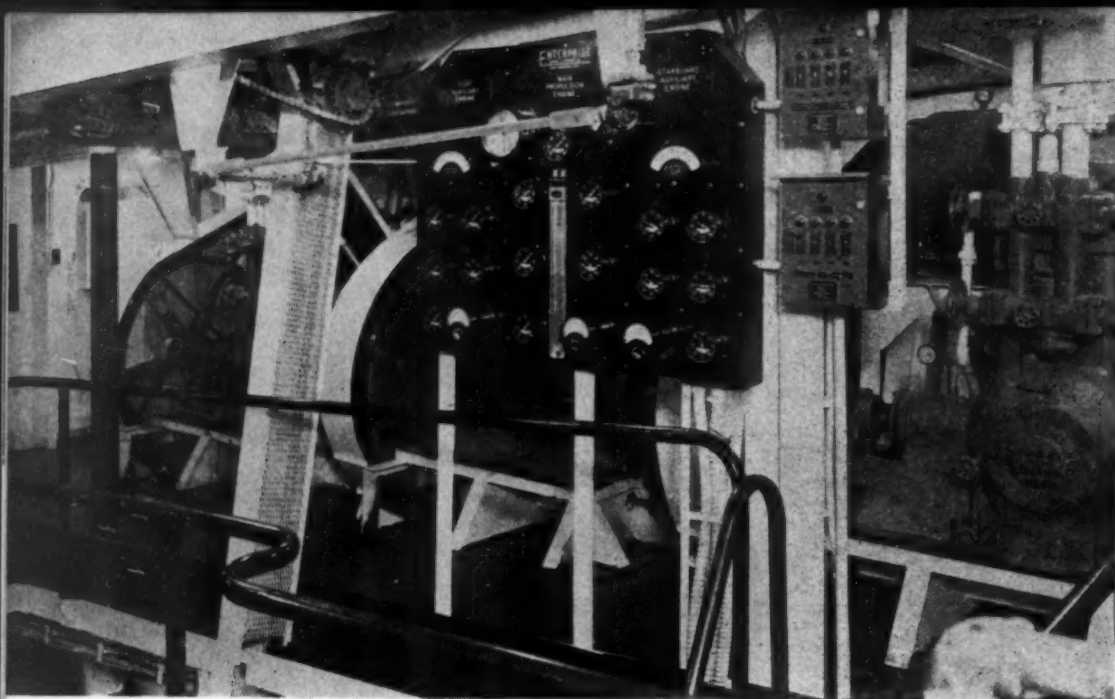


The new and larger tuna clipper, "Chicken of the Sea" does $12\frac{1}{2}$ knots on trials with all tanks full.

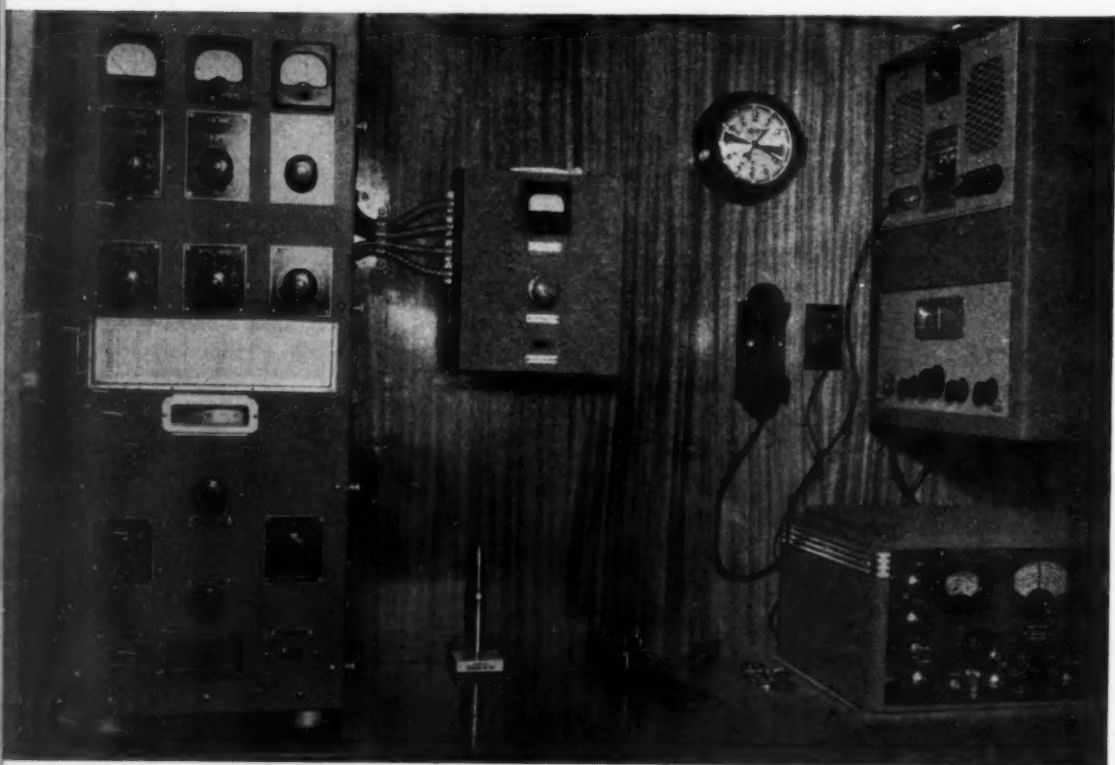


The wheelhouse is fitted with photo electric steering which operates as electric-manual or automatic. Note Weston tachometer on gauge panel.

Left: Lower engine room with 1500 hp. supercharged Enterprise main Diesel on the right and one of the two Enterprise auxiliary Diesels on the left.



Upper engine room view showing Baker ice machine, extreme right, and engine gauge panel, center, carrying Weston tachometers and Alnor pyrometers.



The radio room is fitted with Morse 2-way radiophone equipment.

on the inside, and sanded and sprayed steel plating outside. The white paint does more than beautify the appearance and protect the steel plating: It reflects the torrid sun in the tropics. The whole ship is forced-draft ventilated in every compartment and room, and a sizeable installation of Ilg fans and trim metal outlet louvres is fitted throughout the ship.

Every single bed—not a small bunk, but a 36 inch wide bed with spring mattresses, has its own individual reading lamp and air condi-

tioning outlet. All wide openings on the side of the ship are fitted with light plywood and steel covers, painted white outside, so when resting on a glassy sea, in glaring tropic sun, where noonday temperatures sometimes reach 135, the whole inside of the ship can be made tolerable and everybody given plenty of fresh air, no matter where they work. Even the crows nest, that vital lookout point for spotting schools of fish, is protected with sides and top painted white to reflect the sunlight and lower the temperature.

Placing the pilot house so far forward, eliminates the need of an "outside" pilot house. Its elevation, some 20 feet above the water, gives full visibility all round. The rounded bait tank ends make it easier to keep them clean and protect the men from sharp corners back where they fish from movable steel racks slung over-side and but 1½ ft. above the water's surface.

Overall dimensions are 142 x 30 x 15 ft. loaded draft. Net tonnage is 223; gross tonnage 502.04 and deadweight tonnage 1020.7 (all long tons). Capacity is from 400 to 600 tons of frozen tuna, carried in 12 refrigerated holds below and 3 bait tanks aft. When all bait is used up these spaces are converted from tanks of live bait, in circulating seawater, to refrigerated compartments filled last, just as the ship starts for home.

Double bottom fuel tanks are arranged so that 10 of them carry 27,000 gallons; 2 forward deep tanks 3500 gallons each; port and starboard (aft) ballast tanks, 2,000 gallons each; No. 1 port and starboard brine well, for outbound voyages are converted to hold 9,500 gallons of fuel each and No. 6 port and starboard brine well 7,000 gallons each, also on the outbound voyage only. A total of 70,000 gallons of fuel can be loaded for the outbound voyage, and figuring fuel consumption, with everything running, at 100 gallons per hour, she carries enough fuel for 700 hours of operation at full speed—or for about 35 days of average operation, more under certain conditions. Two thousand gallons of lube oil are carried; 5,300 gallons of fresh water in tanks fore and aft and 5,000 gallons of potable water. Fully loaded, her 1,500 hp. supercharged Enterprise Diesel, turning at 900 rpm. will drive her in excess of 12 knots—1½ knots faster than the average clipper. The Enterprise main Diesel is a marvel of compactness, and quiet operation, even at full speed.

The auxiliaries are mounted almost parallel on the starboard and port of the main engine, and drive 175 kw. Westinghouse 240 volt, 3 phase, alternating current generators. Thus it is possible, with an almost shoreside 240 volt a-c system to plug in to a cable when docking, to allow overhauls and repairs to the auxiliary sets while unloading fish, yet keep all the refrigeration and pump equipment operating. The main Enterprise drives a 94 inch 3 bladed Coolidge propeller, through a Kingsbury thrust bearing and a Goodrich Cutless rubber stern bearing.

On the upper level, where, due to the flare in the hull, much more space is available, is located on the port side three 50 hp. Baker ice

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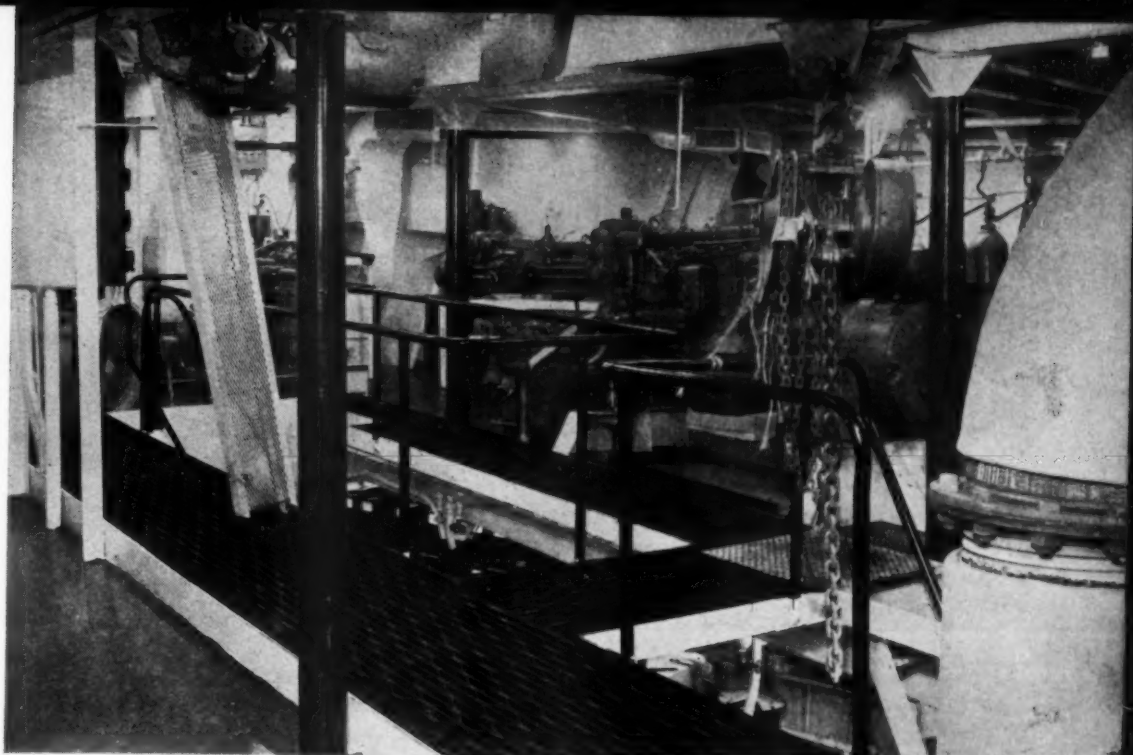
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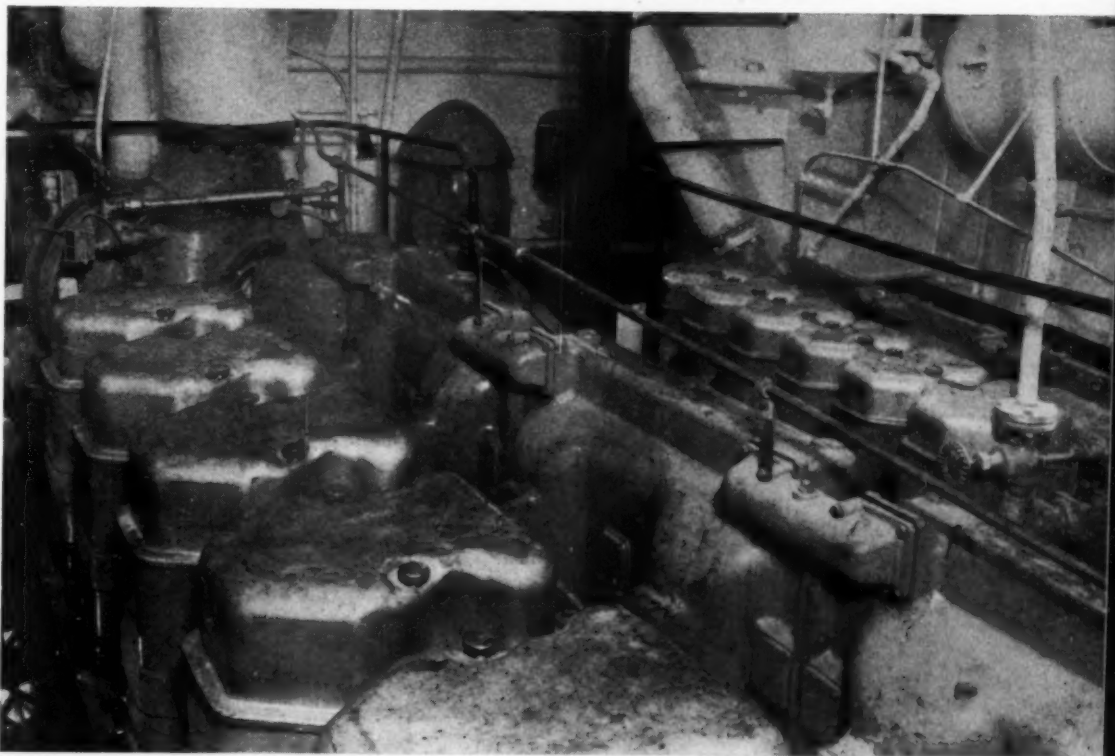
machines, large 2-cylinder machines driven by V-belt drives; a 15 hp. Ingersoll Rand air compressor; and a 53 hp. Caterpillar Diesel auxiliary, driving a 30 kw. G.E. generator, and a small Quincy air compressor through Twin Disc clutch, to provide enough starting air for starting one of the Enterprise auxiliaries after complete shutdown. A roomy, but compactly fitted machine shop occupies the space on the starboard side of this area. All Diesels can be serviced from the top through removable grating. The three Diesels have their gauges all centered on a 3-unit control panel on the upper level. Full pilot house control of the main Diesel is fitted, together with Weston tachometer, air gauges, etc.

With this type of fishing, where part of the fish holds serve as live bait tanks on the outbound voyage and part of them serve as fuel tanks, and all, including the 3-compartment bait box aft, serve as refrigerated holds on the return voyage, the pumping layout is tremendous. Some 50 motor driven pumps are fitted, to supply tanks, fire, bilge, seawater circulation through the ammonia condensers and main Diesel heat exchangers, etc. Each condenser and cooler has its own circulating pump. Fairbanks, Morse fresh and salt water sanitary systems are fitted. All insulation is cork throughout. All brine and ammonia piping is welded—some 25,000 feet of it. A 17 bottle Walter Kidde CO2 system is fitted. The most modern type of photo-electric steering gear is fitted, the new large series built by Webster Brinkley Co. of Seattle, and the radio and navigation equipment is lavish and of high capacity, being built around a Radiomarine 2-way radio phone set; a fathometer and an Intervox direction finder installation. The anchor winch and the small gypsy on the cargo boom are motor driven. The boom winch is a Gates-Westinghouse unit while Johnson Foundry Co.'s anchor winch is fitted.

The galley is large and equipped to seat 20 at a time, with walk-in refrigerated box and a large electric refrigerator besides; electric percolator, waffle iron, tile sink and oil fired range. Crews quarters layout on the upper deck begin with an oil skin and paint locker forward (well ventilated) followed by crews quarters for 8 in a roomy space running across the entire ship, with plenty of built-ins and individual ventilation and lighting. Aft, starboard, is the shower and toilet space, and port, the radio operator's room, which includes, as well as his radio, his own living quarters. Aft of this is a second identical crews quarters space for 8. Aft of this is the chief engineer's stateroom on one side



Machine shop and Caterpillar Diesel generating set are located in upper engine room.



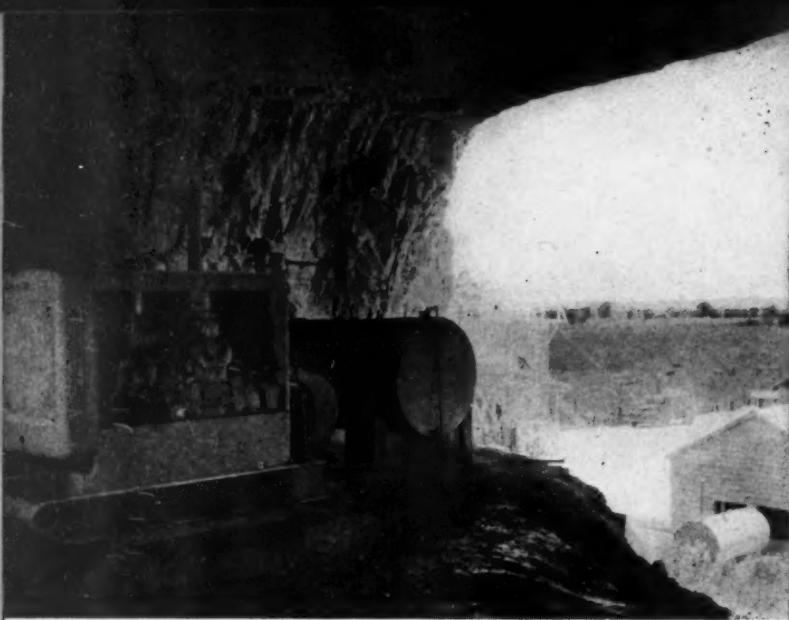
View from middle engine room grating looking over cylinder heads of Enterprise main and auxiliary Diesels.

and the guest room opposite, both connecting.

The top deck consists of the large pilot house, with captain's quarters and chart room aft. A feature of the elaborate equipment installation is a public address system with stations in the galley, chart room, radio room, engineer's station, crews quarters, upper engine room and atop the bait box. No time lost in emergencies or when fish are sighted. Each station can answer the captain's station but are otherwise not intercommunicating . . . experience has

shown that the jolly crew tends to make a 10-party line out of it—a noisy bedlam if they were intercommunicated instead of wired as a straight public address system. The Morgans seem to have thought of everything on their new *Chicken of the Sea*.

This great, beautiful white ship is the finest, handsomest fishing vessel afloat in the world today. The *Pride of the Morgans* and the envy of all the rest of the Pacific Tuna Clipper Fleet.



Diesel air compressor unit in limestone quarry.



Caterpillar Diesel tractors with Trackson Traxcavators loading shot limestone in mine.

At the mouth of the mine there are crushers and hammermills producing agricultural lime. All machinery is driven by Diesels.





Close-up of the jaw crusher with its Diesel driving unit.



This close-up of the Diesel loading unit was taken in the mine, 500 ft. in limerock bluff.

DIESELS RESCUE WORN-OUT FARM LAND

By DOUGLAS SHEARING

MANY of our nation's fields are "war weary." For years they have been worked overtime to produce food for victory. For, despite mechanization, victorious armies on both battle and home fronts still travel on their stomachs. To revitalize these "war weary" fields, farmers are using thousands of tons of limestone which sweetens the soil and permits growing of legumes to rejuvenate impoverished ground.

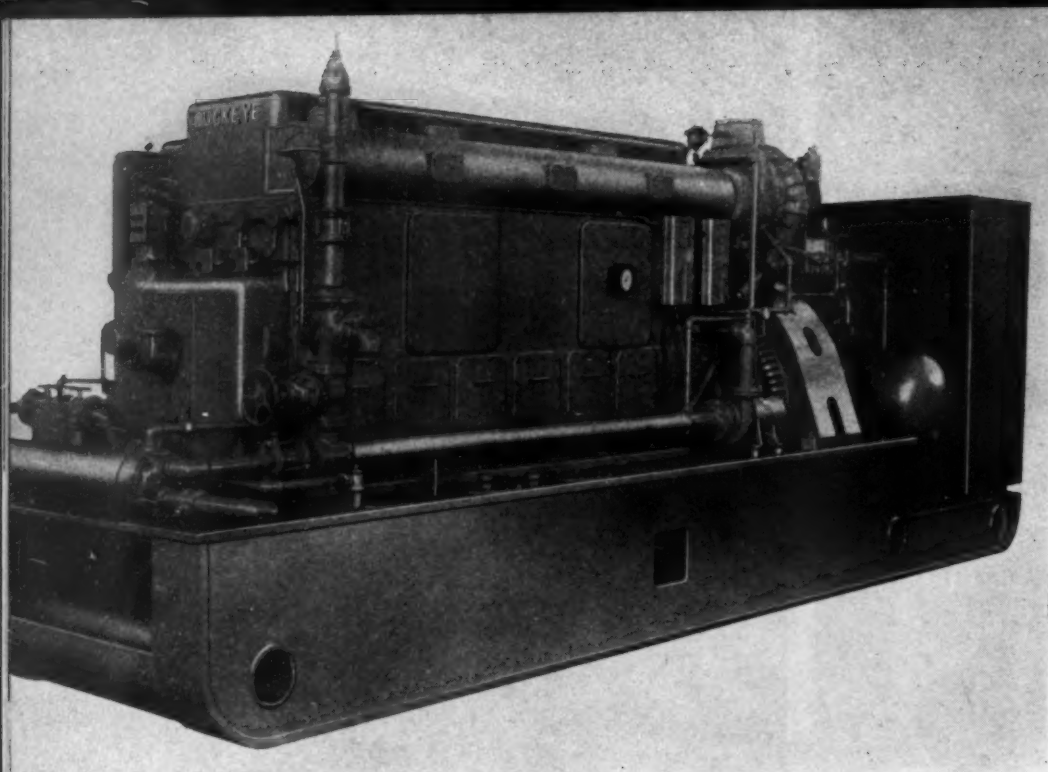
Correspondingly, quarries are working long hours to produce this agstone. To meet the demand many quarry owners have turned to Diesel engines to power traxcavators, compressors, jaw crushers, and hammermills that convert limestone in the quarry to the finely crushed material that is spread on farms.

An interesting example is furnished by the Al Stotz quarry at picturesque Prairie du Rocher, Illinois, across and down the Mississippi River from St. Louis, Missouri. There, deep in a

300-foot river bluff, is one of the country's most modern quarries to be developed underground.

Inside the underground quarry a Caterpillar Diesel engine powers a Sullivan compressor for drilling dynamite holes. After the rock is shot, two Caterpillar Diesel tractors, equipped with Trackson Traxcavators, load the limestone into dump-type trucks.

The material is then hauled outside, through quarry tunnels, where it is converted into fertilizer by means of a Pioneer jaw crusher and an American hammermill, both powered by Caterpillar Diesel engines. It is estimated that eighty per cent of the Stotz output goes into agstone with the remainder of the output converted into road rock. Tests have indicated that there is an abundance of high grade rock still available and that the Stotz crew will be kept busy for many years in its task of helping to keep a peaceful world well fed.



TURBOCHARGED DIESEL GENERATING UNIT FOR UNRRA

PORTABLE generating units, taking full advantage of Diesel availability and dependability are playing a vital part in the rehabilitation of war-torn communities throughout the world. The beauty of them is that a complete power plant including prime mover with its fuel supply and all operating accessories, generator and sub-station can all be mounted on a common sub-base or skids, occupying about as much space as a medium-sized motor truck, can be set down most anywhere and will start supplying current for public utilities within a few minutes.

Last November The Buckeye Machine Company delivered the first of 26 such units con-

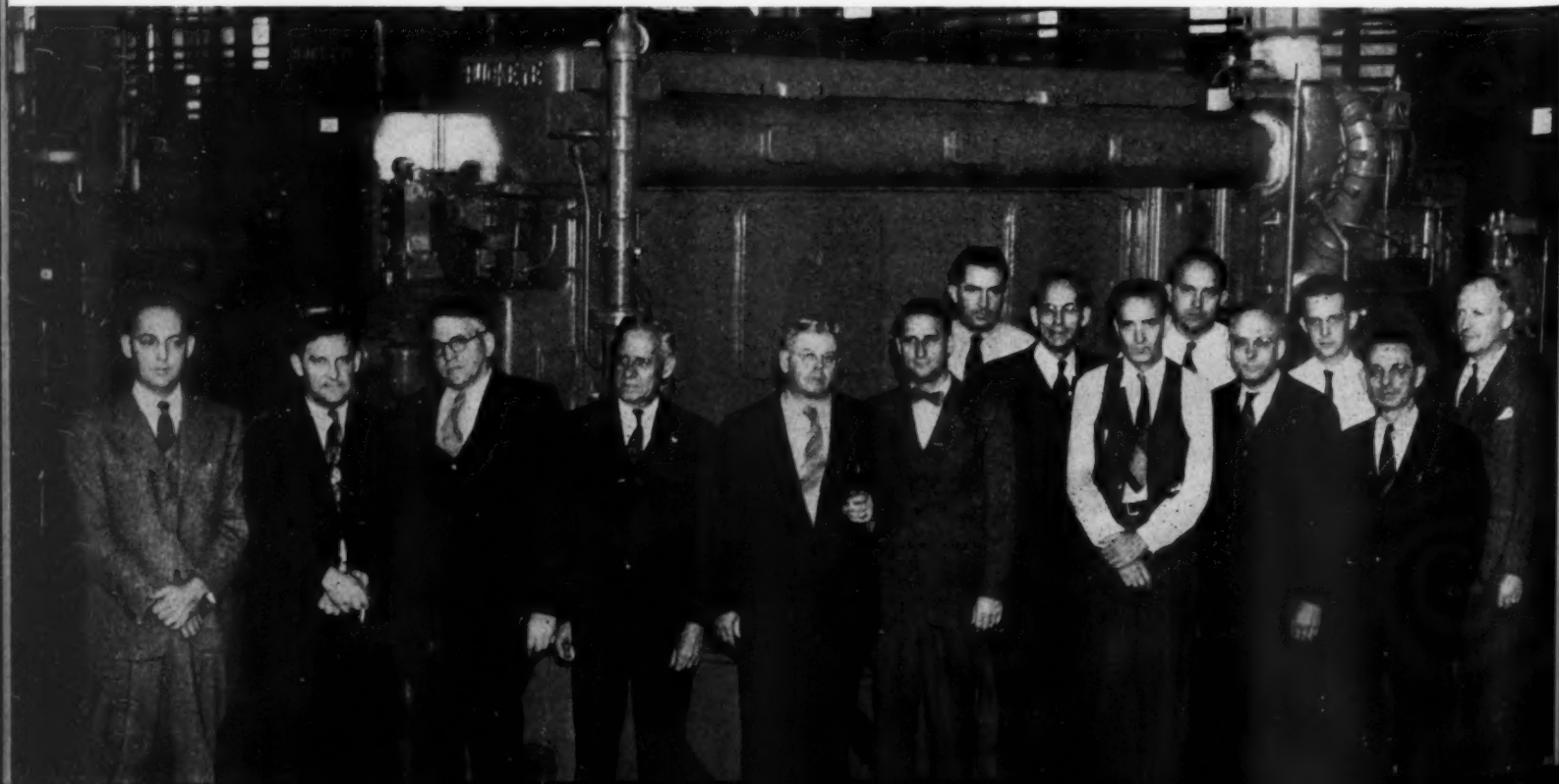
tracted for by The United Nations Relief and Rehabilitation Administration. This one went to Greece—others are scheduled for Poland, China and various Central European countries where serious health problems have developed through lack of power for water supply, lighting, sewerage disposal and other public facilities. The speed with which this program is being carried forward is seen in the fact that the final engine on this contract for 26 is scheduled for shipment within 4 months after the first.

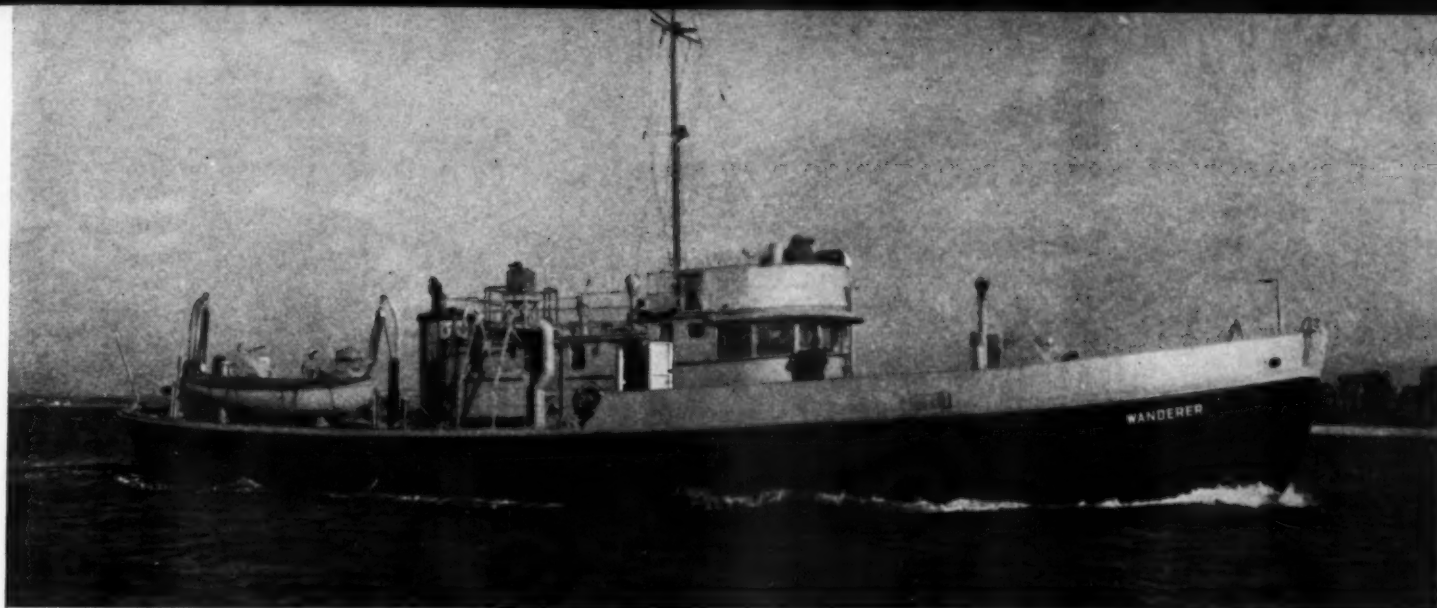
The prime mover is a Buckeye 7-cylinder Diesel, rated 633 hp. with Elliott-Buchi turbocharger with direct-connected Electric Machinery, 400 kw. alternator. A Carrier evaporative-type cool-

er is fitted in the closed cooling system. Overall dimensions of the complete unit, ready to operate, are, length 28 ft., width 7 ft., and height 9 ft. Complete automatic protection against failure of lubricating and cooling systems, common to all Buckeye Diesels, is of vital importance on these units, some of which may be in charge of unskilled operators.

To mark completion of the first unit, which, by the way, employed the first of the Buckeye, 7-cylinder, turbocharged Diesels ever built, The Buckeye Machine Company entertained a large group including U. S. Treasury and United Nations Relief and Rehabilitation Administration officials.

Group of engineers, U. S. Treasury and UNRRA officials who inspected the first unit on completion at the Buckeye plant.





Diesel yacht "Wanderer," Sperry Gyroscope marine laboratory.

NEW MARINE INSTRUMENTS Tested On "Floating Laboratory"

RADAR devices still on the secret list, as well as new developments in other marine instruments designed to increase safety in navigation are now being tested by the Sperry Gyroscope Company in a well equipped "floating laboratory." The company has procured, under charter, use of the sea going, Diesel yacht *Wanderer*, so that new marine devices developed by Sperry research engineers can be rigidly tested under actual sea conditions. Acquisition of the *Wanderer*, according to O. B. Whitaker, Sperry marine sales manager, is in keeping with the company policy of 'designing equipment with the operator and ship owner interests uppermost.

Before the war, Whitaker explained, it was comparatively easy to find a ship operator who welcomed the opportunity to have new navigating devices installed on his ship for service testing. The *Wanderer*, when under the private

ownership of R. W. Allen, served to test a variety of Sperry equipment, and was fully equipped with such instruments as the Gyro Pilot, Gyro Compass, and steering gear.

However, service testing on privately owned vessels or yachts has become extremely difficult under conditions today, Whitaker pointed out, because ships are not yet being operated over established routes. What may have been intended at sailing as a three or four day run, today is likely to end in many months of wandering before returning to the home port. With the facilities of a marine laboratory a practical necessity for Sperry, opportunity to procure use of the *Wanderer* offered the ideal solution. A sturdy and seaworthy craft, she is 100 feet long, with a 26 foot beam, and draws 12 feet. She is powered with two Cooper-Bessemer Diesels of 350 horsepower each, and with an auxiliary generator capacity of 120 kw.

for laboratory use. The cruising radius of 6,000 miles provides adequate facilities for service testing under sea conditions.

The *Wanderer* also has a creditable war record. Taken over by the Coast Guard in February, 1942, she served well and faithfully on convoy duty between Boston and Halifax for one winter, and, later, on rescue and general utility duty at Rockland, Maine. She was taken over by Sperry last July. Her sturdiness, together with other desirable features such as unusually large wheel house-chart room, complete cruising accommodations, machine shop, and ample space for equipment installation, make her well adapted for laboratory and experimental purposes. Besides radar and Loran instruments, other equipment now undergoing tests on the *Wanderer* include Sperry's new Gyro-Magnetic compass, and latest developments in automatic pilots and steering apparatus.

Wheelhouse with array of navigational instruments undergoing actual service tests.



Machine shop for minor repairs and modification to instruments while under way.



GREAT NORTHERN RAILWAY

COMPLETES

HAVRE, MONTANA,

DIESEL SHOP

By CHARLES F. A. MANN

ANOTHER vital link in the gradual Dieselization of the whole Mid-Continent section of the Great Northern Railway has been completed and put into operation—the new \$500,000 Diesel shop at Havre, Montana, approximately the mid-point between St. Paul and Puget Sound. Sometime in the Spring of this year, another and almost identical Diesel shop will be completed at Great Falls, at the crossroads of the two long Montana secondary main lines, to complete locomotive service facilities to serve a region as big as the State of New York and almost as much mileage as between New York and Duluth, Minnesota.

Readers of DIESEL PROGRESS have followed closely the economic studies made by the Great Northern as to the future of motive power on that sprawling system. A heavy coal hauler on the Lake Superior end of the line; a main artery of transportation in what appears to be a big new oil field—the Wyoming-Montana region; and a successful operator of a sizeable electrified section, the Great Northern's use of Diesel has not come without every hazard and economic angle being carefully weighed before placing an order. In 1944 we showed how Diesel best fitted into the central portion of the G.N.'s main line, from the end of the electrified zone at Wenatchee, Washington to the flat country at Havre, Montana, and down through the Central Montana Country where two long secondary main lines form an X, at Great Falls. It is, therefore, logical that the current phase of the G.N. Diesel program should focus on expanded service and maintenance facilities at Havre and Great Falls, in the heart of a booming oil country and in a region where traffic density does not always justify ultra-high speeds and very heavy roadbed investment just to permit outside steam power to maintain schedules with proper size tonnage trains and medium light passenger trains.

As of December 31, 1945 the Great Northern's Diesel Fleet is as follows:

58 Diesel Switchers (360 to 1,000 hp.)

11 Road-switchers (1,000 hp. with passenger controls and heating boilers)
3 2700-hp. Road Passenger & Freight
6 2700-hp. Road-Freight
6 4050-hp. Road-Freight
15 5400-hp. Road-Freight
5 4000-hp. Road Passenger

104 Total on System

Thus with roughly 215,000 hp. of Diesels, the G.N. seems well on its way to becoming one of the larger Diesel users among U. S. railroads. As of December 1, 1945, the G.N. had 10 additional road-switcher Diesels on order and three 1500 hp. road locomotive units on order for 1946 delivery.

Direct impetus for the Havre Diesel shop development is the use of fifteen 5400 hp. General Motors Diesels in freight service between Havre, Mont. and Appleyard (Wenatchee) Wash., a distance of 704 miles of main transcontinental line. With a normal train of 5,000 tons, the G.N. standard, this fleet can handle most of the normal, non-war traffic on this region, freightwise. The Havre shop is also ideally situated to serve the five 4000 hp. two unit General Motors passenger Diesels, that will haul the Empire Builder between St. Paul and Wenatchee, at the foot of the Cascade Mountain electrified zone. It has been officially confirmed that the G.N. has ordered two 5000 hp. single unit, 104 ft. long, 12 motor, electrics to

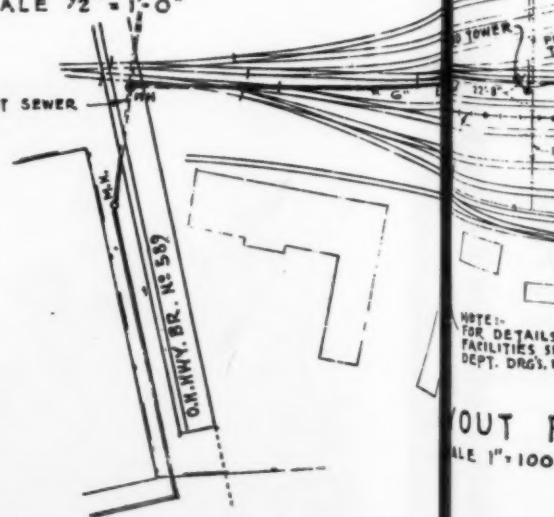
supplement its present fleet in the electrified zone, thus giving semi-official answer to the two year question as to whether or not the Diesels would operate between Wenatchee and Seattle right through the electrified zone. Sound economics of electrified railroad operation dictate the maximum usage of track, trolley and substation facilities throughout 24 hours of each day. Obviously, in spite of the flexibility of using a Diesel straight through from St. Paul

to Seattle-Tacoma, the Great Northern is using sound horse sense, as usual, in working all types of its power to the maximum usefulness. Speed restrictions on mountain curves and grades; smoke elimination in the 8 Mile Cascade tunnel, third longest in the world and regenerative electric braking all contribute to a more sound use of existing electrified operation than to create a messy hybrid of electric and Diesel in this region.

Under these plans, one of the five Diesel passenger locomotives can always be withdrawn for 8 to 16 hours at Havre for servicing and either go West or East on the first passenger that comes along after servicing and maintenance work is completed there. Possibly one

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Night view of the Great Northern's Havre, Montana Diesel shop showing effect of high density lighting.

more Diesel would be required if the runs were extended to Seattle-Tacoma instead of terminating at Wenatchee.

Plans call for routine progressive maintenance schedule on all freight locomotives, each locomotive being held from 6 to 8 hours at the end of every 3,000 miles of operation.

The new Havre shop centers around the main building, 240 x 94 ft. overall, with a 70 x 50 ft. extension on one end and a separate storehouse

for parts 100 x 55 ft. connected to the repair shop by concrete platforms.

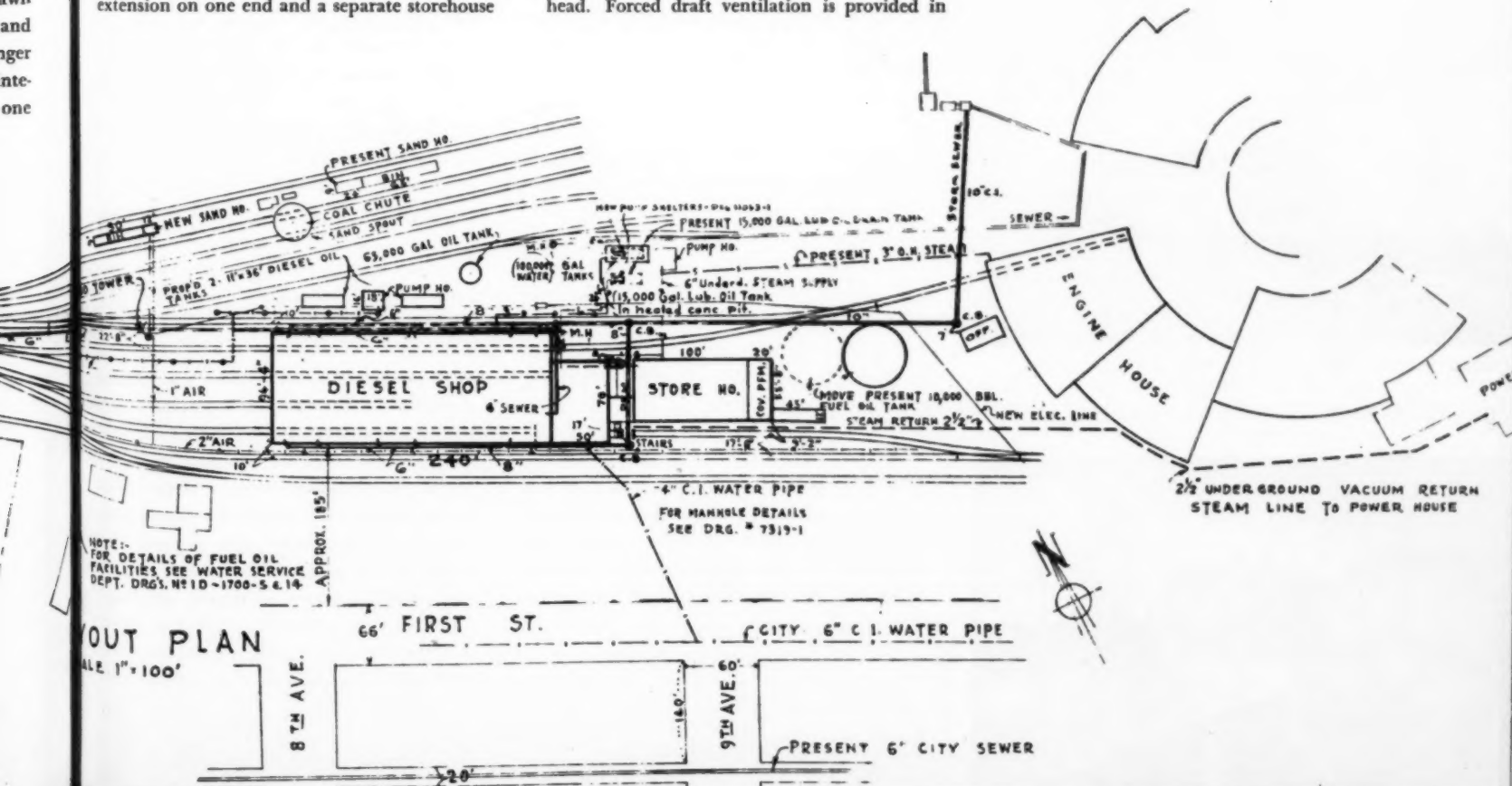
The structure is built on a concrete foundation resting on piling driven to hardpan, and has concrete floor and columns, brick walls, stone trim, steel and wood composite framing, with large areas of glass block windows with steel ventilating sash. Adequate floodlighting is provided for every corner of the working areas, including pits, lower level platforms and overhead. Forced draft ventilation is provided in

the main service section, where the Diesels are likely to be in operation, and gravity ventilation only in the shop section. Central steam heat, via overhead unit heaters with fans is provided for cold Montana winter use. Entrance doors are rolling shutter design, motor operated, so that the building can be entirely closed off once the locomotives are brought in.

The service section has two tracks with pits 205 ft. long and 4 ft. deep. One track is 222 ft. long and the other is a through track 240 ft. long. A unique feature not found in any other U. S. railroad Diesel shop is the fact that the tracks are of extra heavy 152 lb. rail in the service section, carried on short steel columns spaced on 5 ft. centers. This gives a space of 1 ft. 10 inches in depth between the columns, between floor and top of the rail, to allow better entrance of light and air and permit quick passing of tools and parts in and out of the pits. One pit has added outside light via a row of low-level windows beneath the working platform (upper) level.

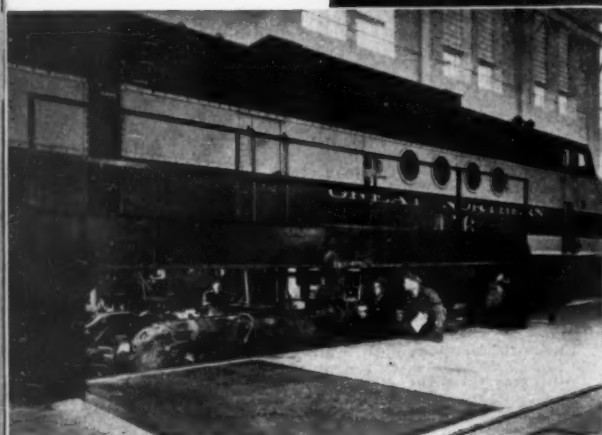
The main floor is depressed 2 ft. 6 inches below the rails between tracks, which, together with the fact that working platforms are 4 ft. 6 inches above the rails, at the cab level of the locomotives, gives 7 ft 4 in. headroom on the pit-level platform area, and ample room for lighting. Submerged pipelines provide lube oil, water and air along both pit track sections. A 2-ton crane is provided also. Two 4-unit Diesels

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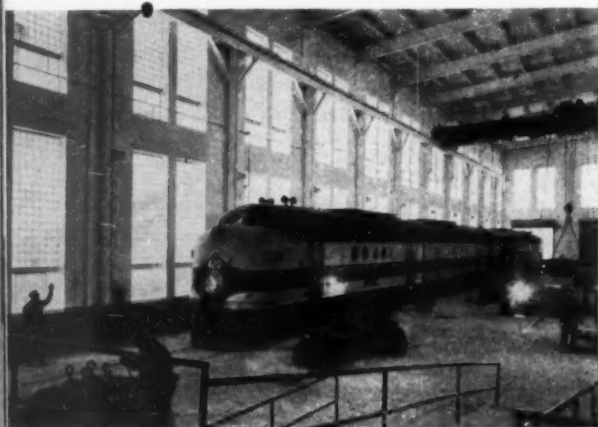




Close-up of body support and drop table which lowers truck to tunnel track for removal to service or storage.



Body support holds locomotive body while drop table lowers truck to be replaced.



General repair bay with overhead crane for lifting cabs and engines.

Elevated platforms and pits permit servicing at three levels.



can be completely serviced simultaneously in this shop area.

The repair section has two tracks, 135 ft. and 214 ft. long, each with a pit 60 ft. long and 2 ft. 6 in. deep, the tracks being ordinary rail laid on continuous reinforced concrete walls. This section is equipped with a 25 ton overhead crane and 5 ton auxiliary hoists for lifting Diesel engines out of the locomotives. There are also two 1-ton Jim cranes with 20 ft. booms.

A drop table is provided having a capacity of 100 tons, and is 23 ft. wide, serving both tracks. Wheel, motor and axle changes and truck changes are made here. Each side of the drop table is served by a 60 ft. long tunnel, where axles, wheels and trucks are stored. The drop table is equipped with body supports for holding up the locomotive cab while wheels are being removed. A wash rack and grease cleaning vat is also provided.

The work room extension has a repair room, cleaning room, parts store room and office and two 1-ton cranes. There is a basement under the extension, providing lunch, locker and toilet facilities for employees, and a separate section of this area has a Refinol plant for

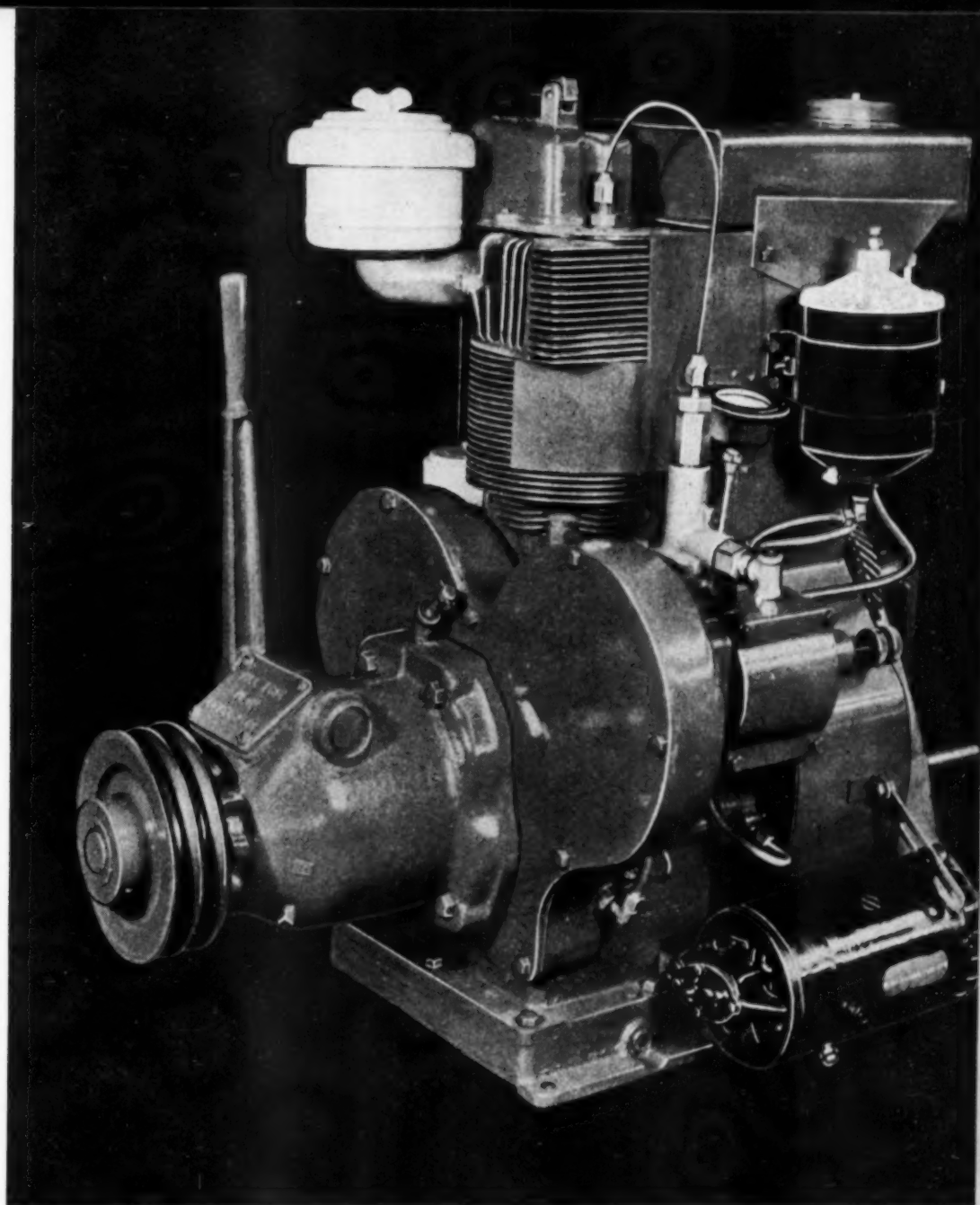
reclaiming lube oil and a demineralizing plant for water treatment and purification for radiator use. The Refinol and water treating plant will also serve the Great Falls shop when it is completed, as no such facilities are being provided there. Two 15,000 gallon lube oil tanks are located outside, one for dirty oil and the other for clean oil. Fueling and sanding is handled outside the shop building area, in a regular, modern "Locomotive Service Station."

The storehouse is likewise of heavy concrete, steel, glass block and brick construction and has adequate hoisting and storage facilities and ample parts storage racks and bins. A modern machine shop layout with ample equipment for repairing cylinder heads, liners, valves, connecting rods, camshafts, etc., is provided in the repair section.

It is presumed that all motor and generator work will be done at the Appleyard (Wenatchee) electric shops for the West end, and at the St. Paul shops for the East end of the system, as at present. Motors, armatures, etc., will be changed out at Havre, if testing reveals necessity of replacement, and shipped out by freight as required, with renewed and rebuilt parts supplied Havre on regular schedule.

The new Sheppard 3¾ hp., single cylinder Diesel—smallest and only air-cooled stationary Diesel engine built.

A NEW SMALL AIR-COOLED DIESEL



A NEW Diesel engine being built by the R. H. Sheppard Company of Hanover, Pa. is unique not only because it's the smallest Diesel ever built for commercial use . . . but also because it's the only stationary Diesel that is air-cooled.

In spite of the high temperatures created by the high ratio of compression inherent to all Diesels—the air-cooling is so efficient that a hand can be laid on the cylinder without discomfort while the engine is operating at full load. This cooling efficiency is accomplished by directing a fan driven stream of fresh air over the more than adequate cooling fins. The absence of a liquid cooling system reduces the weight and size of the unit—as well as the time required for servicing and maintenance.

Overall the engine stands 28½ in. high, 20¾ in. wide and 22½ in. long with crank removed. Because of its small size and portability, the

Sheppard Company predicts wide use of it for powering communication systems, auxiliary lighting plants, pumps and other types of power driven equipment.

It is a single cylinder, 4-cycle Diesel . . . developing 3¾ hp. at 1800 rpm. It has a 3 in. bore, 4 in. stroke. Piston speed is 1200 fpm. at 1800 rpm. Piston displacement is 28 cu. in. Standard governor regulation is 3½%. It is equipped with both hand and 12-volt electric starting.

An indication of its economical operation is its fuel tank. It holds 9/10 of a gallon! A standard Sheppard fuel injection system is used . . . the same one employed on all other Sheppard Diesels. Fuel consumption is ½ lb. per brake hp. hour. The engine—including power take-off and clutch—is complete, ready to operate when shipped from the factory. It is also avail-

able direct-connected to a 2 kw. generator with control box and rheostat.

Many promising fields are opening up for this interesting small Diesel. For example the Railroads figure on installing the engine with a generator in freight cabooses to supply current for train communication and lighting. The unit will find ready acceptance in the rural market for lighting and odd chores about the farm. The new Sheppard Diesel apparently fills a need in the marine field not only for auxiliary service but also for small boat propulsion. The Sheppard Company reports several foreign representatives have requested large quantities of the new engine—up in the thousands. A complete new plant is being tooled for production of the Model 14 Diesel and the first two-months output is earmarked for authorized Sheppard Dealers and Distributors.



The first of two General Motors 71-series Diesels arrives at Heidricks. Note that "Boy!-Aren't-We-Lucky" look on the faces of Heidrick's crew as they prepare to install the Diesel in a combine they are building.

"They, (Diesels) Sure Paid Off!"

By F. HAL HIGGINS

HEIDRICK Brothers—three of them—are as fine an example, as your Old Reporter has run across, of the solution of the ages-old problem of producing food at a profit to the producer while paying wages that meet the expectations of the laborer. The Heidricks are young fellows with both inherited and acquired know-how from doing it with bigger and better machines in the hands of skilled operators. Working with proper tools they can operate, repair, service and even build or improve the machines if and when necessary. And they teamed up the past few years to raise every pound of food possible from the acres they had available with the least number of men possible. But, Heidricks bought the best Diesel tractors and engines and hired the best operators they could find. They paid wages to these operators on a level with industry. They were competing against war and war industries for this skilled labor and they bid the price of such labor up to three times pre-war to get the kind of labor they

wanted. They got it and won. "It paid off" said Joe Heidrick in summing up the policy of the brothers.

Joe Heidrick and eight of his crew of skilled operators were working in and around the ranch shop 3 miles west of Woodland in August when the writer happened past and noted the grove full of combined harvesters, bank-out rigs, tractors, trucks, seeders, portable welding outfits, etc. He began to ask questions of Joe and "Doc" Heidrick, the shop foreman and the men we saw operating electric hand and stand tools, welders, press drills, compressors for painting and steaming, etc. Here in an old barn and out in front of it under the grove of trees was a better equipped ranch shop than half the wheel tractor dealers have in most states of the U. S. And here were "farm hands" doing the work of mechanics, painters, welders, sheet metal workers, etc. It was between-seasons work that kept them on the job at the ranch instead

of being laid off at the ranch to wander down to San Francisco Bay for shipyard or other war work. And they liked the life out on the ranch. They could go to town in their own cars in the evening, most of them living in town with wife and children, according to one.

"It's this way on farm labor these times," explained one of the Heidricks: "We'd a lot rather have these skilled farm machine operators who can service and repair their machines, than the old bindle stiff who had no ambition, family or plans for the future. They were tramps who didn't worry about your property or success. These fellows want to go places with their families. They own their own cars, have ambition and plans. They get better wages because they earn them; they are worth more than the old harvest tramps. They take pride in keeping the combine or tractor they operate going without field failure. That gets us a lot more work done, as one machine out throws

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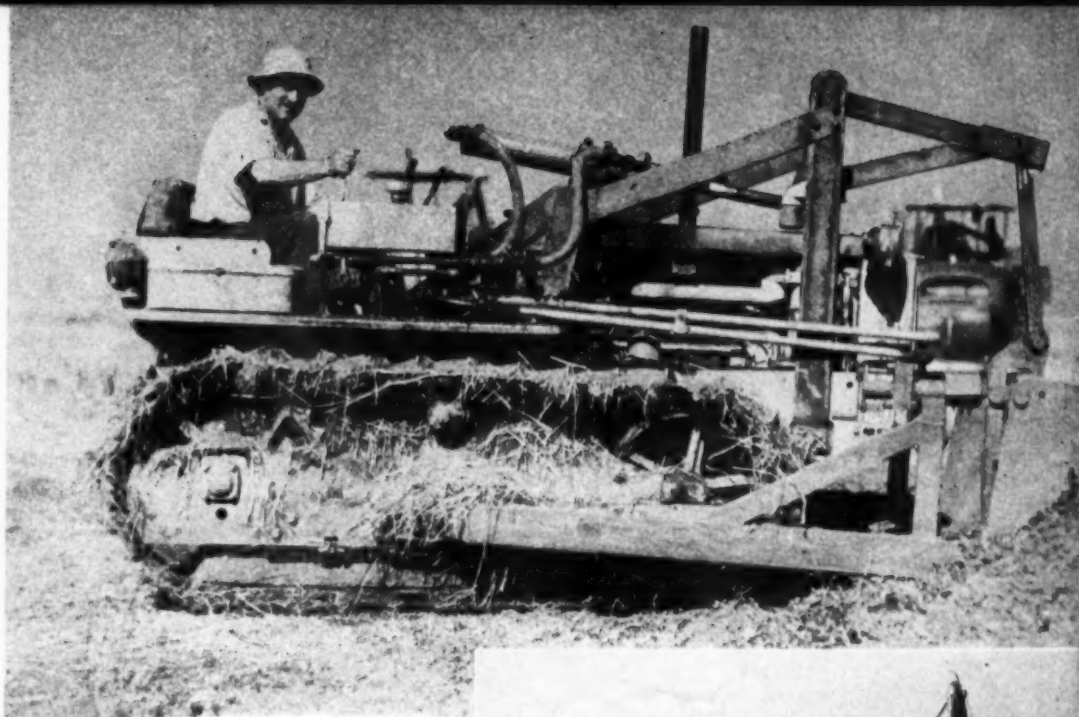
things out of balance and maybe stops several other machines and men."

Last fall the Heidricks built one new combine with a pair of General Motors Diesel engines mounted on it; one for propulsion through the fields, and the other for operating the threshing mechanism. They also added a new International Diesel wheel tractor this year, so that they had a fleet of some nine Diesel tractors and the Diesel combined harvester. The latter was the latest and finest machine in the 1945 Sacramento valley harvest where a lot of ranch-built combines are found.

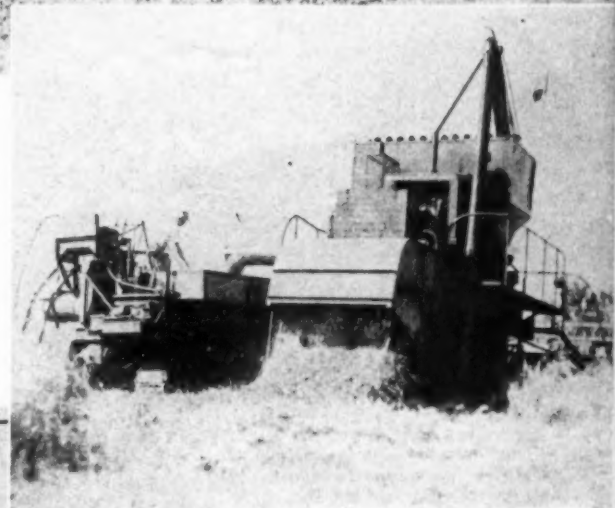
The fleet of Caterpillar Diesel tractors were leveling ground for irrigation, plowing, ditching, pulling bank-out rigs, operating a bulldozer in rice fields to allow trucks to get into and out of fields being harvested, pulling combines, spotting service trucks, etc. One thing that stood out at Heidricks above everything else: the Heidricks were using their heads every minute to figure smoother teamwork for their skilled men operating their Diesel machines. Here's a few time and labor-saving ideas your Old Reporter noted around the machines:

1. Screen-covered peep windows in front of one-man combine bulk tanks and trucks hauling from combine to permit drivers to glance over their shoulders while going ahead to learn how near full or empty their machines were. This saved time and grain or rice.
2. Both screw leveler to prevent overflow of bulk tanks on machine and guard rod over top of bulk grain tank to permit machines to go under telephone wires in moving from field to field.
3. Portable field welding outfits to go out to the field and make repairs on the job for time and labor saving.
4. Balancing of the pair of General Motors Diesel engines on top the combined harvester to distribute weight and get highest efficiency.

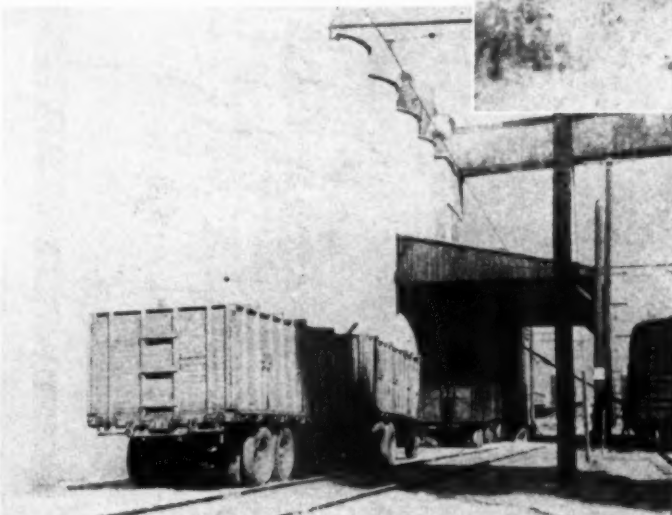
Every Diesel engine and tractor as well as the combines, bank-out rigs, etc., gets the expert service of these skilled operators after it comes from the harvest fields before the next harvest. Besides cleaning by steam, the Diesel tractors get a new coat of paint and engine, tracks, etc., receive a going over with as good service as they would get at a dealer's shop. Housing is available against the winter rains. The Heidricks know the value of their Diesels, and they also know how to get the highest dividends from their Diesel investments. They know labor and how to equip the best skilled farm labor for teamwork that pays off.



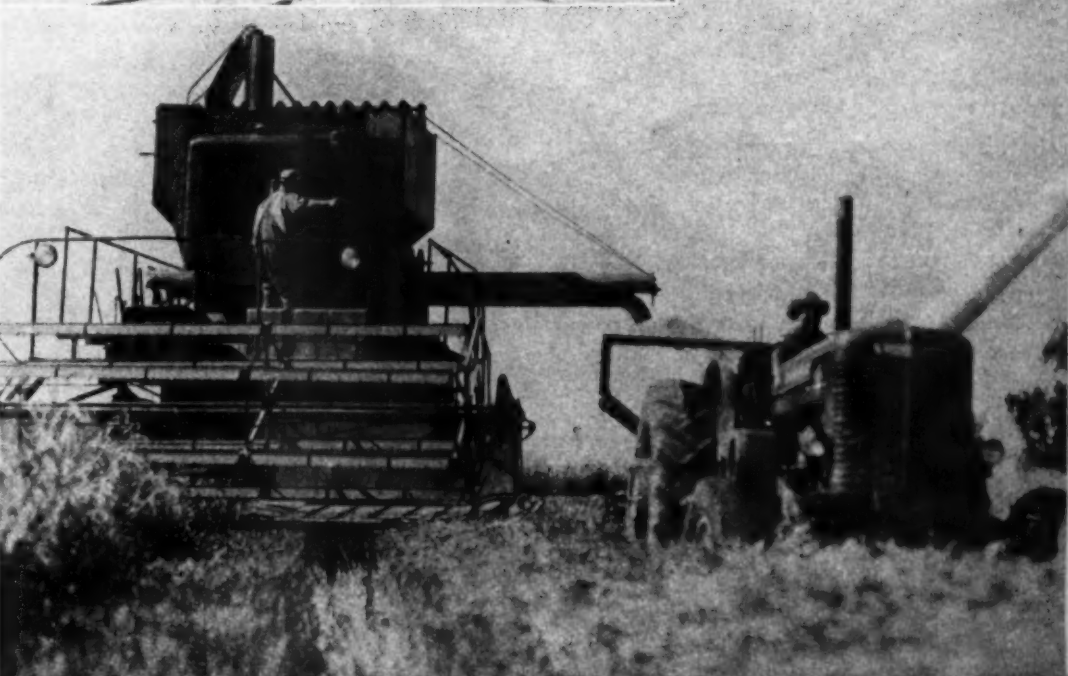
Caterpillar Diesel with bulldozer knocking down rice check to smooth the going for trucks in hauling out.



Cummins Diesel-engined trucks and trailers haul rice to dryer and mill at Sacramento.



Heidrick-built combine harvester with General Motors Diesel mounted high on the rear platform.



Three General Motors Diesels figure in this rice harvest scene, two on the combine and one in the Allis-Chalmers tractor hauling the grain away.



Views around Aluminum Industries' Cincinnati plant. Above the Caterpillar Diesel tractor is loading dross into containers for removal to reclaimer.

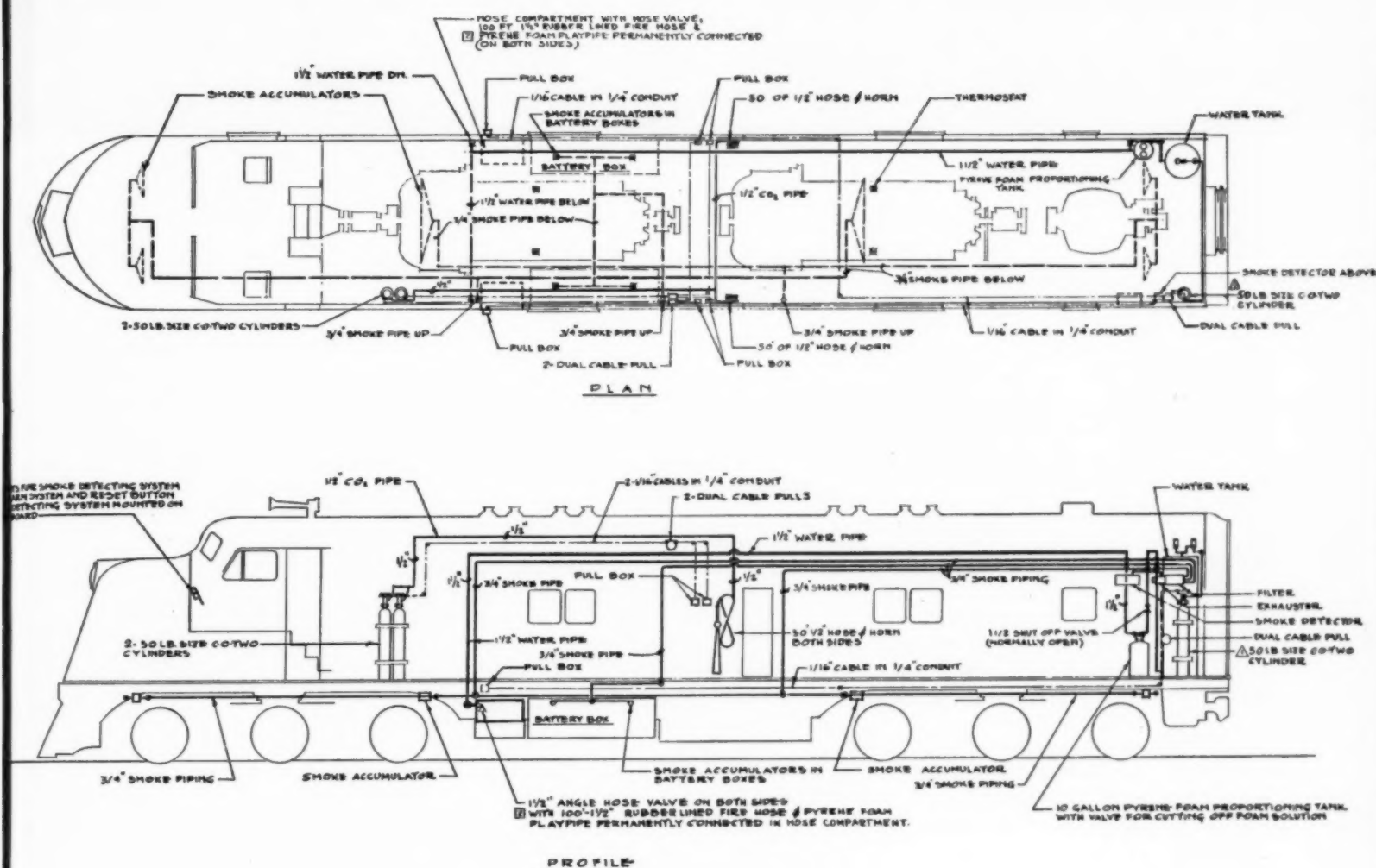
Working over the dross pile—this equipment replaces 10 men.

A handy machine for spotting cars around the plant yard. A snow plow is mounted in winter.



DIESEL HANDYMAN AROUND INDUSTRIAL PLANT

THE Werk Road Plant No. 2 of Aluminum Industries, Inc., northwest of Cincinnati, Ohio, uses a Diesel track-type tractor to considerable advantage around the plant yards. Equipped with a Traxcavator, the tractor is used to load dross from the stockpile into containers, prior to removal of the dross to the reclaimer. The job formerly required ten men. A Hyster winch on the tractor makes it possible to spot railroad cars and when winter rolls around the tractor is used with a plow to remove snow and ice so that yard activities may continue.



Plan and profile layouts of a typical Diesel-electric locomotive showing arrangement of smoke-detecting and fire-extinguishing systems.

Smoke Detecting and Fire Extinguishing Systems

For Diesel Locomotives

FIRES on Diesel-electric locomotives, that might be whipped to dangerous size in the winds caused by "streamliner" speeds, are now promptly detected and extinguished by new equipment installed on the engine that pulls such famous Florida trains as the Silver Meteor, Sun Queen, and Palm Land for the Seaboard Air Line Railway. The equipment was developed by the C-O-Two Fire Equipment Company and the Pyrene Manufacturing Company.

According to Maynard A. Laswell, Vice President of the C-O-Two Company, the system turns a regular locomotive into a veritable "fire-engine-on-rails," since the apparatus automatically detects both smoldering and fast-burning fires underneath or inside the locomotive, and

can kill fires inside the cab while traveling at high speeds or stop to extinguish flames under the train or along the right of way.

Fires over the engines are detected by a thermostatic system which turns on a red "fire alarm" light and sounds a gong. Electronic smoke-detecting apparatus, which it is claimed will function even while the train is traveling 100 miles an hour, reveals fires in the battery boxes or on the under side of the locomotive.

Fires at these points result from accumulations of road dust, dry grass and paper that become saturated with oil and are set aflame by sparks from the brake shoes, and, since the flames are not visible to the crew, considerable damage

may result unless some means of fire detection is provided.

In the engine compartment, fire is extinguished by means of a built-in carbon dioxide system which floods the endangered area with a dry, inert gas, which is a non-conductor of electricity and quickly smothers fire. For fires inside or underneath the engine, carbon dioxide hose reel and hand extinguishers and foam playpipes are provided. By a simple control, the playpipes may be used to discharge either high expansion mechanical foam for oil and gasoline fires or plain water for wood and brush fires. Oil or brush fires as far as 100 feet from the train along the right of way can be extinguished by means of the playpipes.

SUPERVISING & OPERATING ENGINEERS' SECTION

Conducted by R. L. GREGORY*

"Factors Contributing to Operating Costs" Part 4

ANOTHER most important factor contributing to operating costs is that of lubrication. Now it is not the writer's intention to go into a long detailed discussion of the technicalities of lubricants, since we have read and reread many articles on the subject of lubrication, and in most instances the more we read the more we become convinced that we don't know what it is all about. Therefore suffice it to say, that maintenance costs and keeping them at a minimum on most of the unit parts, resolves itself almost wholly into the proposition of securing proper and efficient lubrication.

The whole essence of the subject of lubrication seems to have been contained in a statement recently made by an old experienced engineer when he said: "Operating costs are greatly determined by maintenance costs, and to me maintenance costs and keeping them at a minimum are almost wholly dependent upon proper lubrication. Therefore I am interested in lubricants that give me efficient operation, protection to the lubricated parts, and keep my maintenance costs at a minimum."

We all recognize the fact that there have been many new and revolutionary ideas incorporated in Diesel design and production within the last decade. Necessity has demanded these changes. Units have been constructed so that horsepower ratings have been maintained, specific weight per unit horsepower diminished, and the units made more compact to require less installation space. This was the outcome of war necessities, such as the adoption of Diesels for the propulsion of ships, mobile units and transportation uses.

This situation has also been extended to stationary units, and now we are able to secure units of greater horsepower capacity for installation in the same space formerly required for units of much lower horsepower rating. This has been accomplished by speeding up units, shortening the distances between cylinders, cutting here and there, wherever possible to eliminate any excess material. Such radical design

changes have naturally resulted in changes in lubricants.

Higher speed engines mean that more heat is produced in proportion to the size of the engine. At the same time the design has not allowed in many instances much of any change in the way of enlarging the cooling and oil systems, meaning a reduction in means of heat dissipation. Therefore lubricants have had to take the brunt of these changes and oils developed which will maintain proper lubrication under far more strenuous conditions and higher temperatures. With faster running Diesels, combustion must take place in shorter time intervals and as a consequence higher temperatures are a necessity and unavoidable.

But increased heat is not beneficial to lubricants unless they are compounded to stand that heat. In operating a Diesel certain standards of temperatures should be maintained throughout the lubricating system, those standards or rather I might say ranges of temperature should be determined by the cut and try method and once determined, should be maintained as nearly as possible. For instance take the temperature of the crankcase lubricant. A crankcase should never be allowed to run too cool because condensation is very likely to form in a crankcase with cool oil, especially if there is any blowby. The temperature on the crankcase depends on the type of the unit in question.

Then take the case of a piston head. In most units the piston head heat is dissipated by means of the lube oil being passed through it as it flows through the system. If the oil is too cool, there is likelihood of disastrous results the same as there is if the oil is allowed to become too hot. Pressure enters into the picture at this point also. Too low a pressure will not circulate the oil fast enough to dissipate the heat, thus causing checked piston heads. On the other hand the pressure should not be too great.

Heating of a lubricant to too high a point is likely to form an abrasive carbon, a situation to be avoided. Also a lubricant heated too

high will in many instances break down and lose its lubricating qualities, thus setting up a situation requiring more maintenance costs, thus affecting operating costs. Therefore as regards oil temperatures and pressures throughout the lubricating system, a happy medium should be arrived at and those in charge of operation should lend their efforts toward maintaining that predetermined range of low and high temperatures.

Lubricating oils have to be handled carefully. By that I mean that you can easily destroy the properties of those lubricants if you indulge in carelessness in operation. One of the most important items in engine operation is the shutting down of the unit. When a unit has been in operation under a heavy load with temperatures up, and it is to be removed from service, great care should be exercised to see that the oil is properly cooled down. It is usually good practice to allow the unit to run idly for a few moments after the load has been removed, keeping the lubricant and cooling pumps in operation. If your units are equipped with motor operated barring rigs, immediately upon shutting down you can engage this rig, start the unit to rotating slowly, put on the auxiliary oil pump and circulate the lube oil, cooling it as you do by having the cooling agent pump in operation. If allowed to operate in this manner for a few moments the lube oil is cooled to a degree where it will not be damaged.

Much damage and deterioration has been caused to lubricants by shutting down the engine and not paying proper attention to the cooling of the lubricant. This should always be avoided for the good of both engine and lubricant, unless an emergency exists.

Also in starting your unit up, it is well to circulate the oil through the system for several minutes before putting the engine in actual operation. This warms the oil up and improves the pumping and flow condition of the oil. Many units are equipped with continuous oil filters which are in turn equipped with heating coils for heating the oil. A warm lubricant, well circulated through the unit before starting up is a great help in starting the engine.

* Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.

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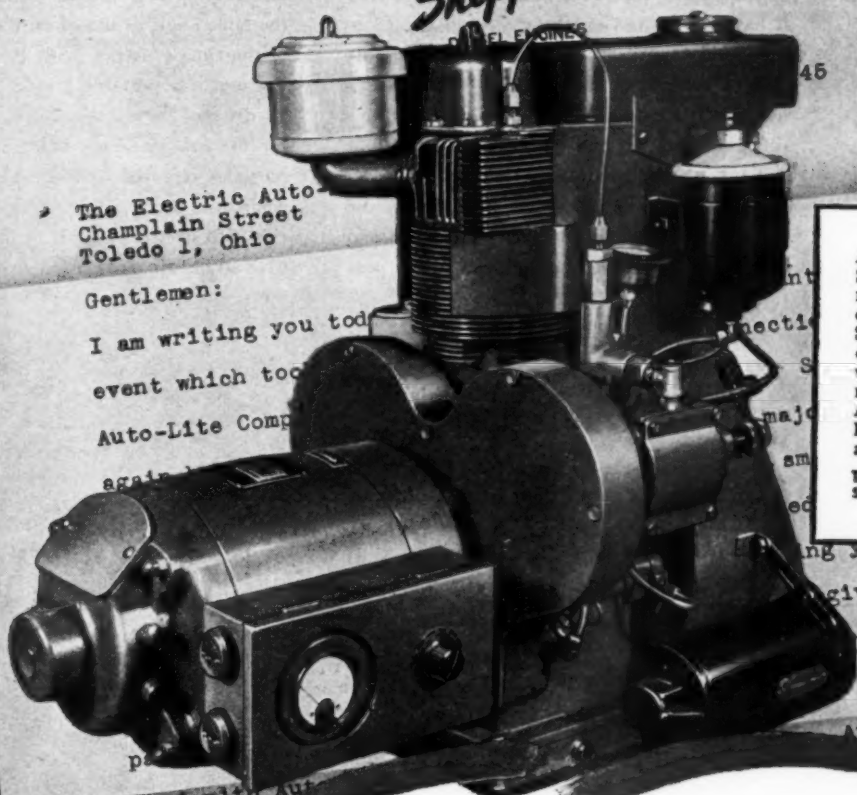
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Exchange Your Diesel Maintenance Ideas

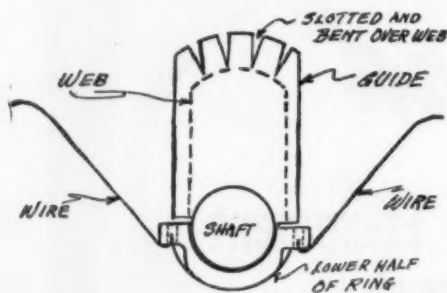
Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"Method Of Servicing Air Stop Rings"

THE following contribution was sent to this department by L. I. Laurent of New Roads, La. and is being passed on to our readers in hope that Mr. Laurent's suggestion may be helpful to some of you in the replacing of these rings.

"Where air stop rings are made in halves, removal of the rings is a comparatively easy operation, but oftimes it is quite troublesome to replace them. This is especially true when the shaft is equipped with counterweights, and there is a shoulder at the juncture of the crankweb and the main bearing journal. The main difficulty in replacing these rings, is to get them properly in place, without dislodging or distorting the springs. The accompanying sketch illustrates a simple method which we use in servicing these rings, and we have found that it saves both time and labor.



"A guide is made from a piece of either 26 or 28 gauge galvanized sheet metal. It should be wide enough to extend about $\frac{3}{4}$ inch on either side of the web, and several inches longer than the web itself. A half circle is scribed from inside diameter of one of the rings, on the lower end of the guide. The opposite end of the guide is slotted as shown and bent to fit over the top of the web. Before installing this guide it should be well oiled or greased to permit easy sliding of the ring and springs.

"The sketch shows the position of the crank with the guide in place, and also the method of suspending the lower half of the ring, after it has been placed on the shaft and turned to the desired position, so that one's hands are free to replace the top half. A stiff wire is hooked half way into the bolt hole on each side and the other end fastened to a hand hole stud. With the lower half thus held in position, the upper half can then be installed and the two halves bolted together. The wires may then be removed and bolts drawn up to position."

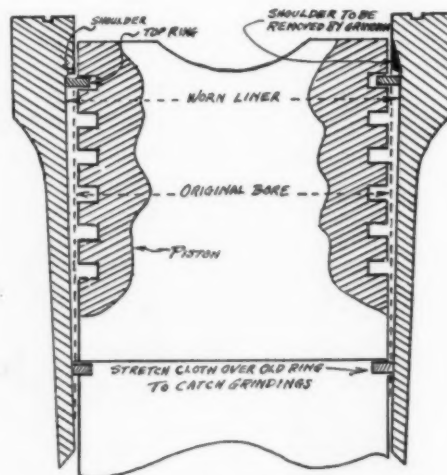
"Removal of Shoulders Which Develop on Liners"

THE accompanying cut shows the wearing of a liner on a normally operating Diesel unit. The vertical dotted line represents the original bore. After several hundred hours of operation, the liner begins to wear, the maximum amount of wear appearing at a point opposite the top ring travel, and gradually diminishing until it is almost nil at the bottom of the lowest ring travel.

This condition produces a shoulder at the point opposite the top ring travel, which condition is aggravated if the shoulder is not removed. The development of this shoulder is injurious for two reasons. First, when new rings are installed and the unit is put into operation a very definite knock develops when the new top ring comes in contact with this shoulder, and with several pistons with new rings installed, the continual thumping noise produced as each top piston ring strikes the liner shoulder becomes very annoying.

Secondly, with new rings installed and this shoulder condition allowed to remain, there is danger that the ring will chip out or break out entirely. This situation depends considerably upon the type of material from which the ring is constructed. If it is a tough material which will batter out, before it will chip or break, the noise will gradually disappear or diminish after a few days' operation. However if the ring material is brittle, the ring may break and immediately the loss of this ring results in blowby.

Therefore, when installing new rings, the liner should be examined and if much of a shoulder has developed it should be removed to much the same angle as shown on the right hand side of the cut. This can easily be accomplished by the use of a portable grinder, either motor or air driven. Use a medium coarse grade of wheel for the first grinding, being sure to catch the particles removed and the abrasive which accompanies the grinding. The easiest way to do this is to stretch a couple of layers of fine cloth over an old ring and insert it in the liner below the point of grinding.



The abrupt shoulder, as shown upper left, should be tapered off by grinding away the portion of the liner as shown by the black shaded area, upper right.

Then follow the first grinding with a fine abrasive wheel and finally finish the job off with a good oil stone, honing the surface well to smooth it off. After finishing the job, remove the ring with the cloth used to catch the ground off particles, then take an oily rag and thoroughly wipe the liner. This removes any fine grit that may have gotten by the cloth so that it will not clog up the oil ports on the side of the liner walls.

If these shoulders are kept well removed, a much smoother operating unit will be noted, and in many cases, there will be less breakage of the top ring, which is often found to be damaged, when new rings are required.

HAND
IN
HAND

Clean Engine Low Maintenance

Sinclair Gascon Oil

By reason of basic characteristics of the crude and built-in qualities GASCON OIL has unusual ability to keep engine interiors clean and also to clear away accumulated deposits.



OILS that permit hard carbon to accumulate cause stuck rings and clogged parts, necessitating engine tear down...adding to maintenance expense and forcing loss of operating time. Reports repeatedly received from users of GASCON over the years show that carbon deposits are kept down with resulting low maintenance costs. May we advise on application of GASCON OILS to your lubrication problems?

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Aluminum Company Planning for 1946

*Construction and Railroad Industries
Are Expected to Consume
Large Metal Tonnages*

By ROY A. HUNT
President, Aluminum Company of America

WITH the aluminum production capacity in the United States twice the total world consumption in 1939, the nation's aluminum industry is putting into effect intensified 1946 sales

campaigns to promote the greatest possible use of the metal.

Aluminum emerged from the war a better metal for many new purposes, and is now available at the lowest price in history. Manufacturers and fabricators plan to take advantage of these conditions to utilize efficiently not only the enlarged production facilities for primary aluminum but the heavy supply of scrap now available. Estimates of the supply of aluminum

scrap range from one to three billion pounds.

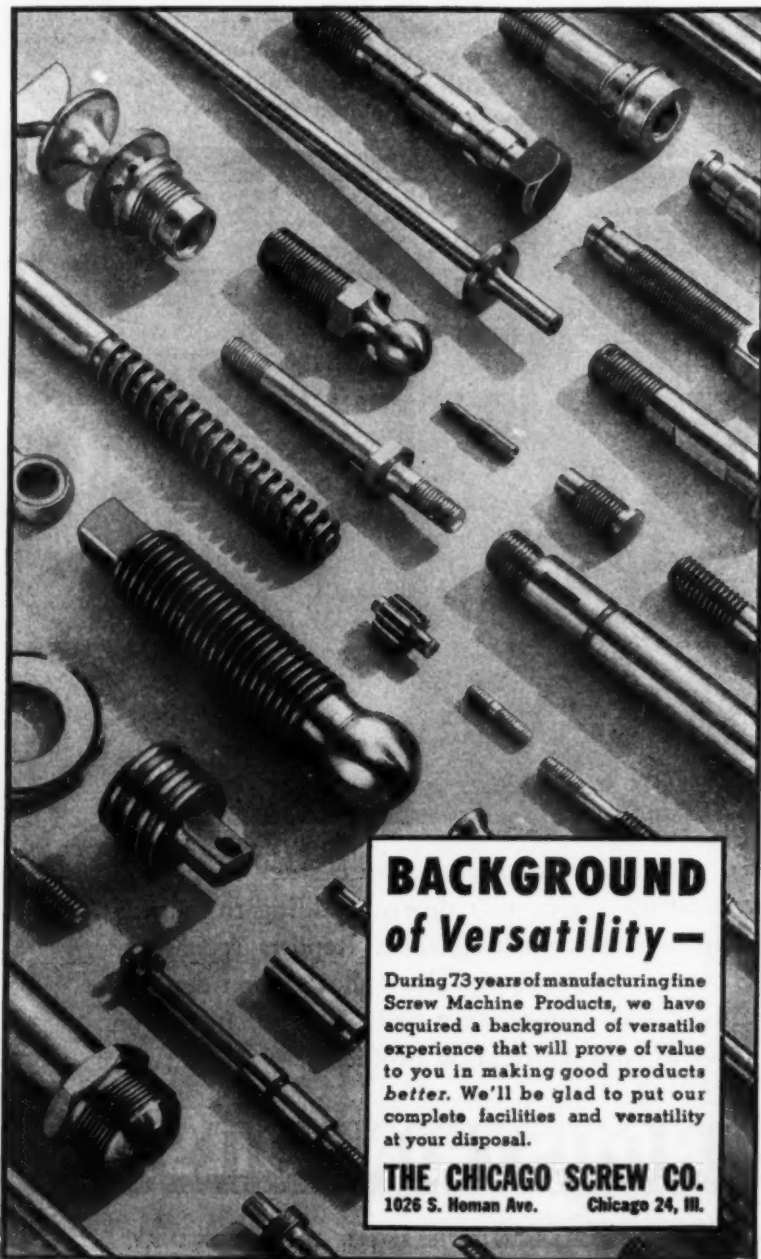
Alcoa looks forward to sharp expansion in its sales force and distributing program. The company has recently opened 11 new regional sales offices and is planning to open 5 more, some in areas where Alcoa previously had no direct sales representation. The company is now selecting qualified men for sales engineering work and preparing them in a thorough training program in its various works. Many of these men are returning servicemen who gained experience with aluminum during the war.

As evidence of the growing acceptance of aluminum for new applications, a trend the industry hopes to accelerate during the coming year, the industry will depend for volume, in part, upon applications comparatively little known till now in a number of the nation's largest industries.

The nation's railroads, seeking modern, more attractive and lighter equipment, are specifying aluminum in many applications for 1946. Of 1,100 rail passenger cars now on order, 160 will be of all-aluminum construction, and the others will average between 2,000 and 10,000 pounds of aluminum per car. Alcoa sales engineers are also calculating the lightening of such specialized railroad equipment as trucks, brakes, air conditioning equipment and lighting systems. Even locomotives in 1946 will employ large amounts of the light metal. The Pennsylvania Railroad has 50 new type locomotives under construction which will average 10,000 pounds of aluminum each for cabs, walkways and boiler coverings. Other forms of transportation, such as trucks, trailers, buses, and airplanes will employ large quantities of aluminum.

G. I. Bill Provides Diesel Training

UPWARDS of 200 veterans, taking advantage of the educational provisions of the G.I. Bill of Rights, have entered the Hemphill Diesel Schools at Memphis and New York for a complete course in all phases of Diesel operation, maintenance and service, Ralph Hemphill, president, announces. A number of these men previously attended the schools, having been stationed there as Army trainees in specialized phases of Diesel work while the schools were being used in the Army training program. In the interim, they have served in one phase or another of military Diesel operation and now have returned as civilians to fit themselves with overall training for a career in this field. Under the G.I. Bill, the veterans are given their training without cost to themselves and, in addition, receive from the government a monthly subsistence allowance.



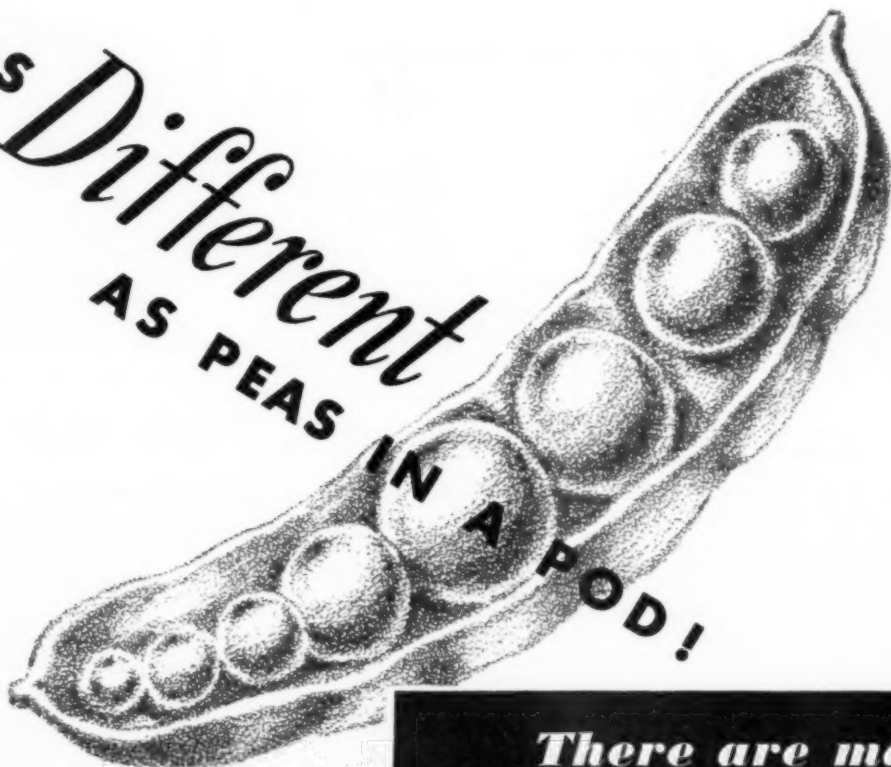
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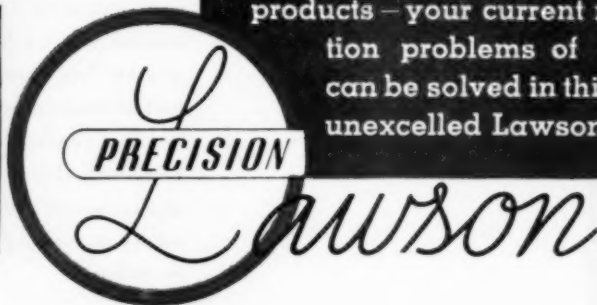


There are many ways to do a job - many good ways, too!

In the precision manufacture of quality parts we are not interested in doing *just a good job* - every Lawson product is the finest that the tops in engineering skill and workmanship can turn out. Our clients of many years will tell you that these high standards of Lawson precision machining pay off in economical, quality products - your current mass production problems of quality parts can be solved in this guaranteed unexcelled Lawson manner.



Hardened, ground, and honed liner used in Pratt & Whitney aircraft engines. The inside diameter of this part is held free from out-of-roundness and taper within .0001".



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Mack-Shell Join In Training Course



Part of a group of public works department contractor salesmen of the Shell Oil Company at a training-course session in the Mack Truck Company plant at Long Island City, N. Y. An example of the co-operative educational campaigns in which two or more companies concerned with related functions combine their facilities for joint or reciprocal personnel instruction. Maintenance problems were the chief subject requested of Mack officials. Failure display-tables for different units were prominent centers in Mack's service laboratory for the Shell session which included also physical demonstrations showing results caused by neglect, lack of understanding or training; the proper handling of automotive equipment and improper lubrication. Earle Milliken of Mack's general sales department was in charge of the meetings, and Shell representatives in attendance, besides those from New York, Albany and

Boston, included contractor men from Minneapolis, Indianapolis, Chicago, Detroit, Cleveland, Baltimore, Atlanta and Toronto, Canada.

DoALL Exhibits Model Shops

A MODEL machine shop suitable for one-man operation which can be housed in the back of a store, a two-car garage, or even in a basement, is being exhibited by The DoALL Company. Conceived by Leighton Wilkie, chairman of The DoALL Company, the model is one of eight types of service and repair shops prepared by industrial planning engineers of the company to assist veterans with mechanical skills who desire to go into business for themselves.

Although the various types of shops are designed primarily for repair and service work in any of the thousands of communities scattered from coast to coast, ambitious operators, Wilkie points out, may readily expand into small specialty parts manufacturing, and from this point, they may follow logical expansion into large modern industries producing industrial and consumer goods.

A sixty-four page booklet, "Make Money With Your Own Shop," describes the entire program. Its purpose is primarily inspirational, and may



One of eight model service and repair shops planned by industrial engineers of The DoALL Company of Des Plaines, Illinois, to assist G.I.'s who want to go into business for themselves.

be obtained free of charge by veterans interested in owning and operating their own businesses by writing to The DoALL Company, Minneapolis, Minnesota.

J. C. Barnaby Moves To Worthington Engineering Staff

JAMES C. BARNABY, Consulting Engineer of Worthington Pump and Machinery Corporation, has been transferred to the General Engineering Staff at the Harrison Works as Assistant Director of Research and Development.



Centrifugally Cast

DIESEL CYLINDER LINERS

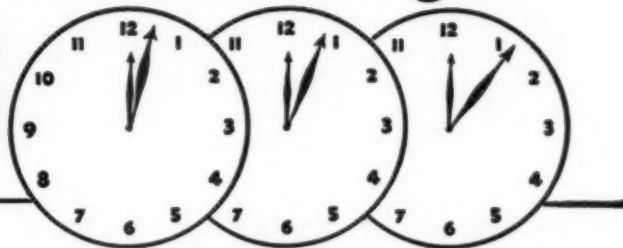
CENTRIFUGALLY CAST DIESEL CYLINDER LINERS by JANNEY are furnished in the completely finished condition ready for immediate installation. Liners are produced under the closest of scientific and laboratory controls. Our facilities for production of liners having I.D.'s ranging between 8" and 14" are exceptionally adequate. We stress that all liners must be void of "free ferrite" which is a most energetic source of scoring. Liners can be furnished with the PORUS-KROME* treatment. Our technical staff is at your service supplemented by our many years experience in cast iron metallurgy.

*Van der Horst

JANNEY CYLINDER COMPANY

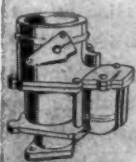
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stores clear, clean
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Excerpts From the G-E Review of Electrical and Allied Developments of 1945

MARINE DIESEL-ELECTRIC . . . 40 PER CENT MORE POWER

Diesel-electric propulsion equipment totalling 110,000 hp. was supplied during the year for 53 vessels, including gasoline tankers, fleet salvage vessels, minesweepers, harbor tugs, and submarines. Among the year's advances in such

equipment were improved enclosures and ventilation. Outstanding was the further development of an insulation system for rotating apparatus—a development which leads to the hope, based on laboratory tests, that it will be possible to obtain a 40 per cent increase in output within the same space and weight limits. Propulsion control design stressed compactness, ease of operation, and shockproof features.

SECTIONAL DRYDOCKS . . . FLOATING FACTORIES



It was announced during the year that sectional floating drydocks were in service in the Pacific, giving the Navy "repair bases today where yesterday there was none." Sectional construction permits the units to be towed by other vessels to a protected location as close to combat zones as advisable, and there assembled and put into service. The wing walls, containing transformers and rectifiers, among other items, are folded flat to the decks while the sections are being towed. Placed together, ten of the sections will float a battleship; seven will care for a cruiser. Besides being joined mechanically, the sections are also tied together electrically, with synchronizing facilities provided for multiple operation of any number of sections.

Because each section is a complete unit in itself, as well as a "hotel" for the men who comprise the service crew, large amounts of electricity are required. Supplied by Diesel-driven generators on each section, this electricity is used to operate machine tools, cranes, welders, anchor windlasses, hoists, blowers, compressors, ventilating and refrigerating units, and pumps for emptying and filling buoyancy compartments. The pumps are driven by 200-hp. vertical motors, while the capstans, which warp the damaged vessel into position, are powered by 30-hp. motors.

The docks are equipped to supply the vessel under repair with both a-c and d-c service. So designed is the power-generating equipment that when a ten-section dock is used, thus requiring all twenty 438-kva. generators to be operated in parallel, current-limiting reactors are connected to limit short-circuit currents. D-c service on each section is obtained from a 300-kw. three-wire sealed ignitron rectifier.

DIESEL-ELECTRIC LOCOMOTIVES . . . BETTER REGULATION

For Diesel-electric locomotives, which had a particularly active year in main-line freight and passenger service, new 1500-hp. and 2000-hp. generators and associated control equipment were developed.

The new power-plant regulating system com-

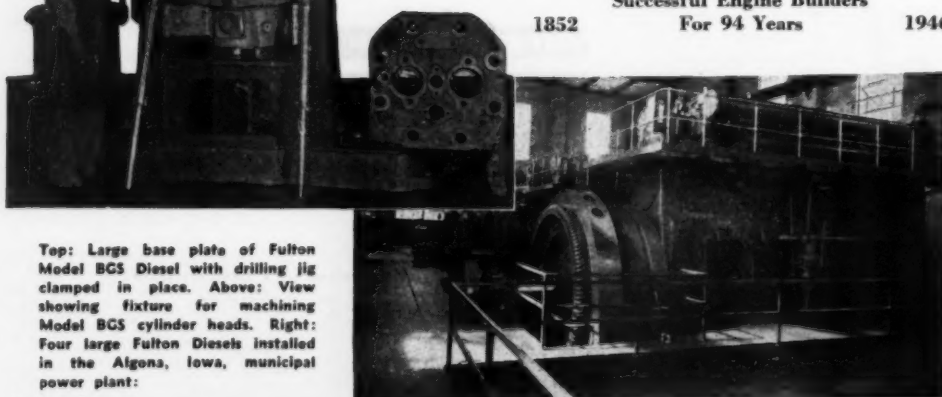
INTERCHANGEABILITY



A Modern Necessity

Long ago, we here at Fulton, recognized the meaning of interchangeability of parts and we tooled our production of Fulton Diesels to give our users this outstanding maintenance economy. Jigs and fixtures are applied to every possible machining operation to produce uniform parts, an exceptionally well co-ordinated engine and to permit replacement with the minimum of time and expense. That is another reason why Fulton Diesels all over the country are turning in remarkably low operating and maintenance cost records.

Successful Engine Builders
1852 For 94 Years 1946



Top: Large base plate of Fulton Model BGS Diesel with drilling jig clamped in place. Above: View showing fixture for machining Model BGS cylinder heads. Right: Four large Fulton Diesels installed in the Algona, Iowa, municipal power plant:

FULTON IRON WORKS CO.
ST. LOUIS, MISSOURI

combines the advantages of electric and hydraulic systems and performs three distinct regulating functions: (1) at light loads it controls fuel to hold constant speed; (2) at heavier loads it controls generator output to hold constant speed; and (3) it controls maximum fuel input as a function of engine speed. It thus holds constant any pre-set engine speed, limits maximum engine torque to a safe value, and adjusts the generator demand to the engine's ability to deliver power at any moment and for any set speed. Among the operating advantages of this regulating system are its unusual stability, high responsiveness, remote control, and safety features. The system's component parts are an engine control panel, a tachometer generator that measures engine speed, an operator assembly connected to the engine fuel lever and rack assembly, and a pressure oil system.

A complete 6000-hp. Diesel-electric locomotive developed for Fairbanks Morse & Company consists of three single-engine units, each weighing 160 tons all on six axles. The trucks are of all-welded construction.

With a top speed of 55 mph. and suitable for both heavy yard duty and road service, a new 600-hp. 70-ton unit rounds out the Alco-GE line, fitting between the heavier 660-hp. switcher and the 380-hp. 44-tonner. This new unit is particularly well adapted for freight and passenger service on lines where roadbed and rail weight limit axle loadings. Its six-cylinder Diesel engine is rated 660 hp. at 1000 rpm. and the four motors and generators were specifically designed for the unit.

The 380-hp. 44-tonner repeatedly "made the headlines" during the year. One of special design for the U. S. Army was the first locomotive across the Rhine before V-E day. (See DIESEL PROGRESS, July 1945) A similar unit, decorated as the "General MacArthur Special," led the triumphal procession marking the reopening of train service to the Philippine capital. In India 44-tonners replaced 110-ton steamers, saving time in watering and coaling operations.

With twelve of the 380-hp. units, the American Railroad of Puerto Rico has started the complete Dieselization of its lines. The Amador Centra Railroad, a logging road with severe grades and relatively low speeds, had its 44-tonner constructed with 20-mph. gearing (35-mph. gearing is standard).

Equalized trucks for better riding, larger cab for greater visibility, and streamlined hood for improved appearance were among the year's changes in the 25-tonner.

New Hilco Filtering Materials for Purifying Heavy Duty Detergent Oils

THE Hilliard Corporation has available new filtering materials for use in Hilco oil reclaimers and Hilco Hyflow oil filters for purifying additive, detergent or inhibited oils. Adstay (cellulose) filter discs are now available for use in the Hilco oil reclaimers. This material can be used in the units now in the field without making any mechanical changes whatsoever. The material has been tested by some of the major

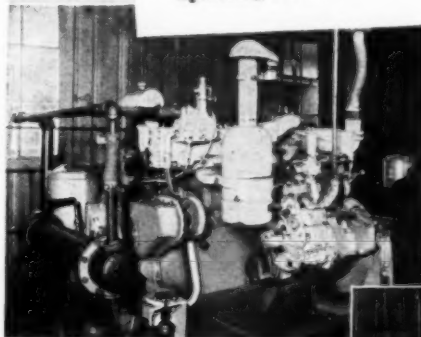
oil companies and laboratories and found to be excellent for filtering oils clean without removing the additive compounds. Hiltex-cellulose is the material used in the filter elements made by the manufacturer for the Navy for filtering heavy duty oils and is now available to commercial users having Hilco Hyflow oil filters in service. It is suggested that present operators of Hilco equipment using heavy duty Diesel lubricating oils communicate with the Hilliard Corporation, 120 W. 4th St., Elmira, New York, for further information.

50% LESS LUBRICATING OIL

for CATERPILLAR DIESELS with HONAN-CRANE PURIFIERS

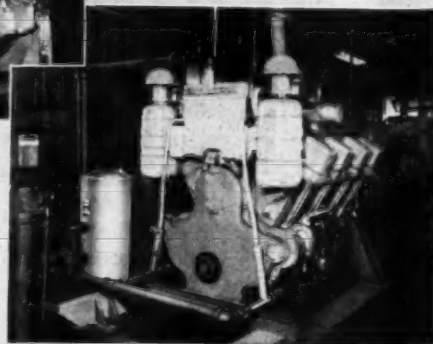
A mid-western pumping station of a major oil company recently equipped its sixteen D13000 and D17000 Caterpillar Diesel engines with Honan-Crane Oil Purifiers. According to their records, lube oil consumption dropped 50%.

Before the purchase of these Honan-Crane Purifiers two of the engines were selected for a test run. These engines were overhauled and equipped with Purifiers. In the test one engine operated for more than 13,000 continuous hours without a change of oil and without a stop for repairs. The other engine went better than 10,000 hours. The use of Honan-Crane Oil Purifiers with these Caterpillar Diesel Engines increased the operating efficiency and substantially lowered operating costs.



This D13000 Caterpillar operated 10,778 continuous hours without an oil change and without a stop for repairs.

This D17000 Caterpillar operated 13,074 continuous hours without an oil change. Practically no maintenance and engine ran at high rate of efficiency.



Write for engineering bulletins on the purification of Diesel lube and fuel oils and complete specifications on Honan-Crane Oil Purifiers.

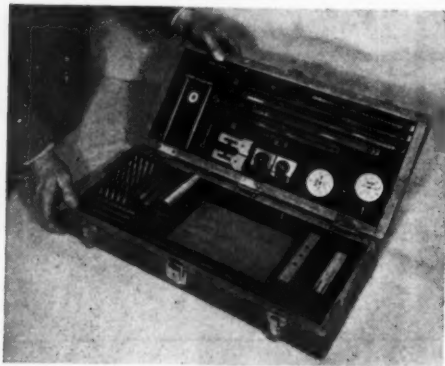
HONAN-CRANE CORPORATION

202 Indianapolis Avenue Lebanon, Indiana

Subsidiary of

HOUDAILLE-HERSHEY CORPORATION

Over a Million Precision Gage Combinations Assembled From Small Kit



The DoALL "Producto-Check" gage kit.

THIS new gage kit called "Producto-Check" is designed for production checking and is manufactured by the Gage Division of The DoALL Company. It consists of a number of instruments to be used in conjunction with gage blocks for quickly setting up practically any type of inspection gage. A few examples of these are the dial indicating snap gage, plain bench comparator, dual bench comparator, angle comparator, square comparator, precision height gage, depth gages, and a series of go-no-

go snap gages of any size up to eighteen inches. Plug gages and internal gages of any size in steps of .0001 inches can be quickly made up from the set. In addition, gages such as hole to hole, hole to base, parallel bore gages, pitch diameter, and many others can be made up for special applications. A set of holders from 2 to 18 inches in length are designed to carry the gage blocks. Besides the hand held gages that can be formed, a whole series of bench and surface plate gages can be assembled by using the base block, master flat or numerous other attachments. In addition to the usual types of gages, there are several unusual ones. One of these is an indicating snap gage incorporating a dial indicator. Another is an internal gage incorporating a dial indicator. Then, there is an angle comparator using two dial indicators, which is set with a sine bar. When an angle identical to that of the sine bar setup is checked, the dials read alike. Included also in the kit is a multiple bench comparator that makes two measurements simultaneously, permitting increased speed in production checking. Another outstanding instrument of the kit is an indicating square check gage. With this, the work is placed on a master flat and is simply pushed against a back stop; a dial indicator showing instantly whether or not the angle is 90 degrees.

A unique feature of the kit is a set of "wires" of various diameters. These are lapped to the accuracy of gage blocks and are used direct as plug gages or in caliper jaws where square jaws could not function or where combination square and round caliper jaws are needed. Any one of the countless gages can be assembled in five minutes or less, and it takes even less time to dismantle and replace in the kit. For further information write the DoALL Company, 1301 Washington Avenue South, Minneapolis 4.

Marine Gauges Now in Production At Liquidometer

A COMPLETE new and improved postwar line of marine gauges to provide the modern boat owners with accurate, dependable indication of fuel and water level, rudder angle and reverse gear position, is now in production at the Liquidometer Corporation.

This company has completed its program of reconversion and is now in a position to supply boat builders, dealers, ship chandlers and pleasure boat owners with various types of Liquidometer gauges in price ranges to fit every class of vessel. Various improvements developed and perfected during the war have been incorporated in its line of instruments for pleasure

IT'S NUGENT for Fuel and Lubricating Oil Filters



THE widespread use of NUGENT Absorbent Type Fuel and Lubricating Oil Filters is indicative of how industry is helping to conserve lubricating oils and fuel oils. During NUGENT'S 48 years' experience in the manufacturing of filters, many thousand NUGENT filters of all types have been installed on commercial and naval vessels, in stationary engine plants. Diesel locomotives, cement mills, rubber mills, steel mills, etc.

Illustration of the Replaceable ("throw away") type recharge.

THE IMPROVED NUGENT DEPTH TYPE PRESSURE FILTER

Figs. 1280A 4L and 1280AU 4L4 show two NUGENT Oil Filters. This type of filter is equipped with one or more standard filter cartridges in a single container or shell of various sizes depending upon the filtering capacity required. All cartridges are alike and interchangeable regardless of whether they are the Repackable type or the Replaceable ("throw away") type. Both types are made for capacities from 1 up to 2248 H.P. in single containers or shells. (Navy specifications.)

NUGENT Fuel Oil Filters are made for Diesel engines from 1 to 384,000 H.P. in single containers.

NOTE THESE SUPERIOR NUGENT FEATURES:

- Easy and neat piping installation because inlet and outlet openings are on opposite sides of the filter, close to the bottom.
- Filters have built-in by-passes—will take full flow or by-pass filtering.
- Drain plugs.
- Air vented.
- Reduces the neutralization number of lubricating oil from 0.40 to 0.04.
- Very inexpensive "Throw Away" Replaceable cartridges.



Fig. 1280AU 4L4 shows arrangement of four cartridges in one shell. Other size shells are made to contain one to twelve cartridges.

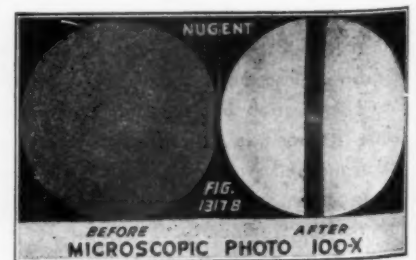


Fig. 1280A 4L illustrates a shell containing one cartridge.

NUGENT FILTERS ARE EFFICIENT FOR KEEPING ALL TYPES OF LUBE OIL CLEAN

Fig. 1317B graphically shows how NUGENT Filters remove harmful grit, dust, sand, carbon, abrasives, etc., from lubricating oils. Picture shows a lube oil sample of *before* and *after* installing a NUGENT ABSORBENT (waste) Type Oil Filter on a 600 H.P. Diesel. The *"after"* sample was taken at 1800 hours' operation. Waste is renewed every 700 hours. The line through the *"after"* picture is human hair. The large dirt particles in the *"before"* sample are about .0017.

NUGENT Filters enable manufacturers and power plant operators to conserve fuel and lubricating oil.



WM. W. NUGENT & CO., INC.
415 N. HERMITAGE AVE. — CHICAGO 22, ILL.
Fuel Oil Filters — Lube Oil Filters — Lubricating Systems — Oiling Devices — Sight Flow Indicators

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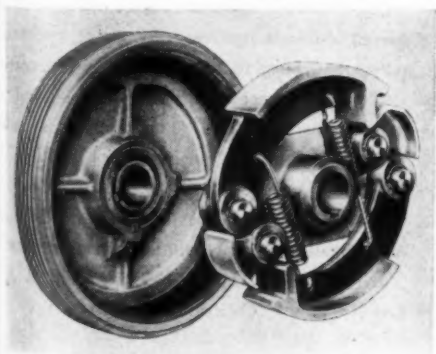
PROGRESS

and commercial boats.

Liquidometer's postwar line includes: an economical direct-reading liquid-level indicator for mounting on the top, side or end of a tank; the type "L" Levelometer, distance-reading hydrostatic indicator; a distance reading, float-actuated electric fuel level gauge which eliminates danger of old electric gauging systems by use of metal bellows seals at tank fittings to prevent escape of vapor or fuel; a distance-reading hydraulic gauge employing a fully temperature-compensated, balanced hydraulic transmission system which does not depend on any outside source of power. An electric rudder angle position indicator is also available. The same hydraulic transmission system used in the fuel gauge can be furnished for transmitting any kind of motion such as rudder angle position or the position of the reverse gear. For details write The Liquidometer Corp., Marine Division, Long Island City, New York.

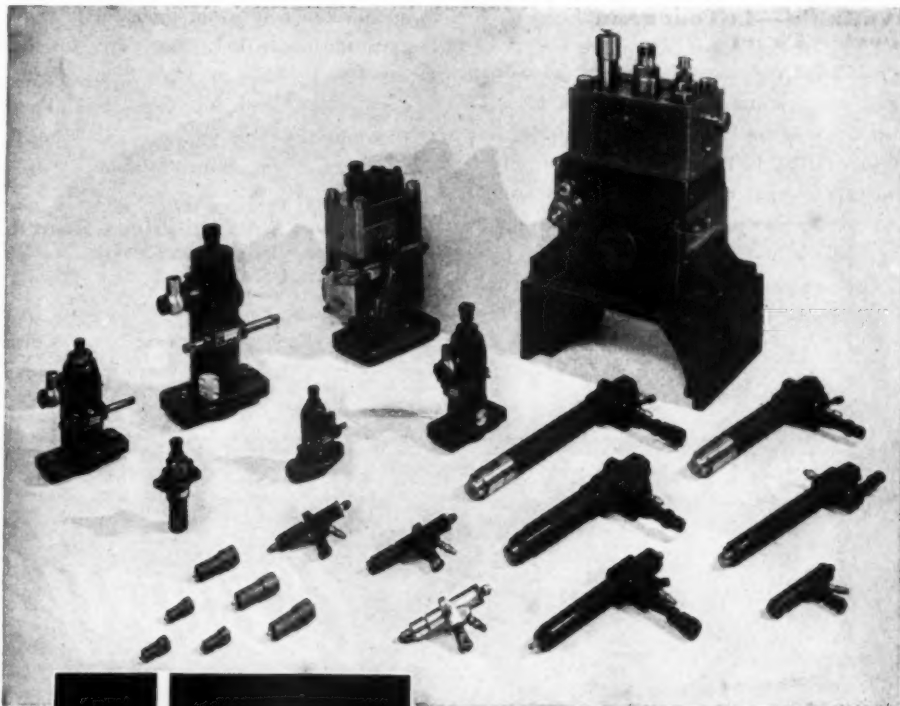
New Type of Automatic Clutch

TO eliminate the sudden shock of starting machinery or moving equipment, a unique, automatic clutch has been developed. It can be installed direct on the shaft of any engine or electric motor. Known as the Salsbury automatic clutch, the device, by centrifugal action, progressively applies the power to the driven machine. It engages and disengages without manual control. In the power field, its use is suggested for gas and Diesel engines.



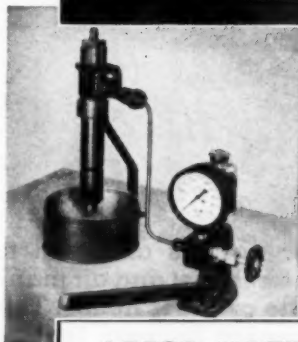
The centrifugal principle, in simple form, is employed to obtain velvet-like action. The clutch is an opposed shoe type, dual-spring balanced, to give the desired degree of tension required for individual applications. Below a predetermined rpm. of an engine or motor, the clutch idles; when the driving rpm. increases beyond the stipulated rpm. the expansion shoes press outwardly, contacting the friction lining.

For full particulars write Salsbury Motors, Inc., 4464 District Boulevard, Los Angeles 11, Cal.



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YOUR SOURCE FOR DEPENDABLE FUEL INJECTION EQUIPMENT



ADECO NOZZLE TESTER For Low-Cost Maintenance

America's most widely used nozzle tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors on bench or engine. Prevents costly delays and possible damage to engine. Standard or Navy-approved gauge. Ideal for testing hydraulic equipment. Write for bulletin.

Whether you need standard fuel injection equipment or special units built to your specifications, Adeco offers the logical source of supply.

Today's line of Adeco equipment, the outgrowth of long experience in serving the Diesel industry, includes: Standard fuel injection pumps in plunger diameters from 7 mm. to 31 mm.; a complete line of standard nozzles and nozzle holders, including the water-cooled type; and the Adeco nozzle tester.

All Adeco products are built to highest standards, with years of trouble-free operation behind them to testify to their reliability.



AIRCRAFT & DIESEL EQUIPMENT CORP.
4401 NO. RAVENSWOOD AVE. • CHICAGO 40, ILLINOIS

Available—LeTourneau Service Chart

ESPECIALLY prepared for service and maintenance men, a new wall chart, size 17 x 22 inches, is now available for use as a quick guide in lubricating LeTourneau equipment. It is designed to hang on field office, shop wall or wherever convenient for easy reference. Photographs show lubrication points on every piece of LeTourneau equipment, and the chart tells what kind of lubricant to use and how often. Stressing preventive maintenance, the chart is

intended to help avoid prematurely worn out parts and costly down time. Free for the asking, the Lubrication Wall Chart, Form No. G-1067, may be obtained from any LeTourneau Distributor, or by writing directly to R. G. LeTourneau, Inc., Peoria, Illinois.

Socony-Vac Announces Board Elections and Marketing Division Changes

THE Socony-Vacuum Oil Company Inc. has announced the election to the board of directors

of John F. Seal and C. Francis Beatty. Mr. Seal, who has been assistant treasurer since 1931, will become treasurer, succeeding Arthur T. Roberts, who retires on Dec. 31. Mr. Beatty, until recently president of the Socony Paim Products Company, will be active in the marketing operations of the company.

The company has also announced that, effective Jan. 1, the Eastern and Central Marketing divisions were combined under the direction of Walter L. Faust, vice president. Mr. Faust has been in charge of Eastern Marketing since 1933. Previously the Central Marketing operations have been supervised by Charles E. Arnott, who is retiring on Dec. 31. Mr. Beatty will be associated with Mr. Faust in conducting operations in the newly-combined marketing areas.

New Booklet Describes Chemical Methods for Speeding Diesel Engine Overhaul

"HOW Surface Chemistry Can Speed Up and Simplify Diesel Engine Overhaul," a new, handsomely illustrated, fact-filled booklet, is offered by Turco Products, Inc. The booklet describes in specific detail labor-saving, chemical shortcuts which make possible increased production without increasing present overhaul facilities.

Fast, simple methods of removing carbon, grease, oil, asphalt and tar, are described. A procedure is outlined for cleaning and descaling the cooling system. A setup for salvaging parts from wrecked equipment is explained. Chemical methods for removing and preventing rust, and for preventing scale are discussed. Facts are given about removing old paint, preparing painted surfaces to receive a new paint coating, and preparing metal to bond durably, and permanently with paint. The booklet is packed with useful information for Diesel men.

This interesting booklet is offered without cost or obligation, simply on letterhead request to Turco Products, Inc., 6135 So. Central Ave., Los Angeles 1, California.

Taylor Issues Refrigeration Catalog

WITH the great strides that have been made in refrigeration during the past few years has come an increasing need for proper and complete instrumentation. The Taylor Instrument Companies has just published a 36-page catalog dealing exclusively with the application of control instruments to the refrigeration field. The catalog is divided conveniently into two sections, one covering applications—the other, instruments.

• BUCKEYE DIESELS •

Always

DEPENDABLE



"BE PROFIT-WISE AND DIESELIZE WITH BUCKEYES".

NAVIGATORS know that a compass is **DEPENDABLE** for guidance. North is *always* **NORTH**.

Buckeye Diesels give their owners that kind of dependability, too. The name "Buckeye" on an engine has been the symbol of **DEPENDABLE POWER** ever since 1908 — *always* a proved guide to **DIESEL ECONOMY**.

Every feature of Buckeye design and construction has been developed to bring greater dependability and economy to users of Diesel power. For example: No bolts, studs, cap

screws or gaskets are used to secure the exhaust and air manifolds to the cylinder heads. This is an exclusive Buckeye feature which, by making cylinder heads easily removable, eliminates valve cages. As a result, valve areas are larger and combustion efficiency is increased by providing unrestricted air flow and quicker expulsion of gases.

Stationary Engines 150-900 H.P.
Diesel Generator Sets 100-800 KW.

WRITE TODAY for your Buckeye bulletins. Place your order **NOW** for early delivery.

***Supercharged Ratings to 1440 H.P. and 1000 K.W.**

THE BUCKEYE MACHINE COMPANY • LIMA, OHIO

• ENGINE BUILDERS SINCE 1908 •

The applications are reproduced for the purpose of showing certain processing requirements in refrigeration. Although each individual application differs, there is nevertheless a similarity in all applications. The instrument section illustrates the instruments available for refrigeration processes accompanied by pertinent information so that it is possible to choose an instrument for any type of refrigeration.

Copies of Catalog No. 300 may be secured by writing to the Taylor Instrument Companies, Rochester 1, New York.

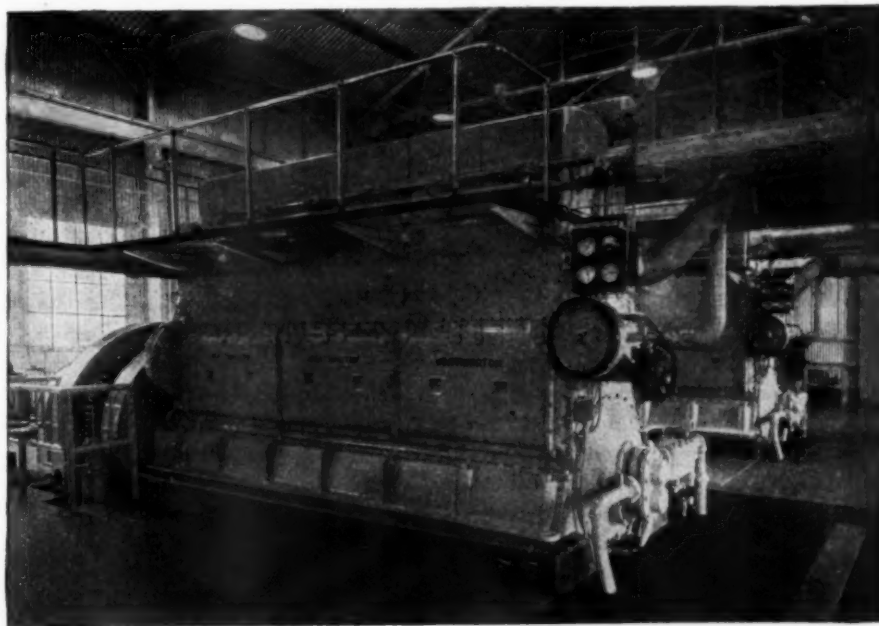
New Boat Yard Formed

WALTER W. HAERTEL of Sturgeon Bay, Wisconsin, who has been connected with the Kewaunee Shipbuilding & Engineering Corporation of Kewaunee, Wisconsin, in the capacity of Naval Architect and General Superintendent, severed his connection with this concern on October 1st, and has returned to the private practice of Naval Architecture. He has also associated himself with Robert Krauss, former hull superintendent, in the same yard, in the formation of a new boat yard in Kewaunee, which is now open for business under the name of Krauss Kraft Company.

This concern will specialize in the construction of welded steel commercial vessels up to approximately 80 feet in length, and has work underway on two contracts; one for a 52 foot commercial fish boat for Joseph Gayner, Jr. of Port Washington, Wisc. and the other for a 65 foot passenger and automobile ferry for the Washington Island Ferry Company for use on the 6 mile Gills Rock to Washington Island run at the north end of the Door County peninsula above Sturgeon Bay.

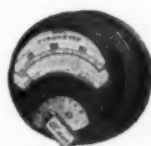
The fish boat will be powered with a Model 8-DCMR-1125 Buda Diesel and will be a typical Lake Michigan gill net type, of welded steel construction throughout.

The ferry will be of a double deck type, with space for nine cars and 150 passengers. This new vessel will replace one of the two wooden ferries now in use on this run, and will be of steel to the upper deck; the passenger cabin being of plywood construction. Because of the necessity for all-year-around operation, which means running in heavy ice, construction is sturdier than usual, with close-spaced framing forward and heavy plating along the waterline. The main engine is a Kahlenberg six cylinder 180 horsepower with full pilothouse control. Auxiliary equipment will include a 110 volt lighting plant and an oil burning heating system.



Rely on Alnor Pyrometers

for accurate exhaust temperature indications



Type AX, Alnor Exhaust Pyrometer

The routine check of exhaust temperatures with Alnor Pyrometers provides a reliable guide to efficient Diesel performance, and correct maintenance and adjustment. As in so many of the Diesel power plants setting records for continuous service, these Worthington convertible Diesel gas engines are equipped with Alnor Exhaust Pyrometers.

Alnor Exhaust Pyrometers are built in a complete range of single and multi-point types, to meet the needs of any engine, large or small. Write for special Exhaust Pyrometer bulletin.

ILLINOIS TESTING LABORATORIES, INC.
420 North LaSalle Street
Chicago 10, Illinois

New Bulletin On Electric Motors

STAR Electric Motor Co. has published an 8-page, file-size, condensed catalog bulletin (printed in Spanish and Portuguese as well as English) embodying specifications and descriptions of standard motors and generators of its manufacture, and describing facilities for building special motors. Illustrations show many typical applications in hoists, comminutors, canning machinery, Diesel generators, dry-cleaning machinery, printing equipment, machine tools, and other equipment in which severe service conditions are encountered. Specifications and load capacities are included for squirrel-cage induction motors $\frac{1}{2}$ to 200 hp.; wound-rotor induction motors $\frac{1}{2}$ to 200 hp.; direct current motors one to 200 hp.; and design features of Star gearmotors and brakemotors. Write Star Electric Motor Co., 200 Bloomfield Ave., Bloomfield, New Jersey, requesting Bulletin 3a-16.

Elliott Appoints E. I. Pollard

ELLIOTT Company announces the appointment of E. I. Pollard to the engineering staff of the Ridgway plant. Pollard comes to Elliott from the Westinghouse Electric Corporation where he was in direct charge of the design of alternating current marine generators. Previously he was responsible for the design of

large water wheel generators, synchronous condensers, and turbo-generators up to 50,000 kw. A graduate of the University of Nebraska in 1928, he received his Master's degree in 1935 from the University of Pittsburgh.

New Fuel-Oil Pump

A NEW special rotary pumping unit for handling bunker "C" fuel oil and liquids of similar characteristics has been put into production by the Blackmer Pump Company, Grand Rapids, Michigan, according to J. B. Trotman, General Sales Manager of the company. The pump is bronze-fitted and operates on the "bucket design" (swinging vane) principle. Due to this construction, the pump is self-adjusting for wear, so that there is no loss of capacity during the life of the "buckets." When worn to the critical point the buckets may be replaced by simply removing the head of the pump, pulling out the work buckets and inserting new ones. No adjustments or "wearing in" are necessary. This replacement restores the pump to normal capacity. The power unit is a gearhead motor of 50 hp. with a speed of 150 rpm. at the drive shaft connected to the pump by a flexible coupling. The pump has a capacity of 500 gpm. and operates at a pressure of 125 psi.



Here's why **THOMPSON**
DIESEL ENGINE VALVES
CUT MAINTENANCE COSTS!

IF YOU operate any stationary or mobile diesel equipment—from the smallest industrial engine to the largest, in any kind of service—you can increase engine efficiency, extend time between overhauls and cut your maintenance expense with Thompson Valves, Seats and Guides.

THE REASON IS THIS: Thompson Valves are made by a hot-forging process from steels especially developed for valve use—"Fercrome L" stainless steel for the valve head, chrome nickel for the stem. These two steels combine to give you a valve that is free from oxidation, scaling and corrosion to 2000° F, has high ultimate strength values at high temperatures, and maintains perfect alignment for efficient valve operation. **Result: Continuous smooth operation at peak loads and under the most severe service conditions!**

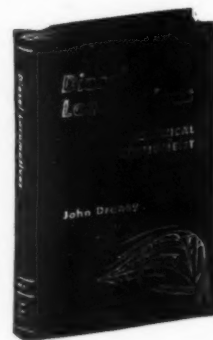
Thompson Valves, Seats and Guides are standard equipment in most of the leading diesel engines manufactured... proof of the quality, long life and trouble-free service built into them. In the original engines you buy... and for replacement needs in your present equipment—make sure you specify Thompson!

SEND FOR THIS BOOKLET—Here's helpful information your mechanics and maintenance engineers can use to increase the service life of diesel engine valves, seats and guides. Contains non-technical data on engine valve installation and maintenance... facts gleaned from over 40 years experience in this field. Your copy will be mailed without obligation—write today.



Thompson Products, Inc.
WEST COAST PLANT • BELL, CALIFORNIA

RAILWAY LOCOMOTIVE ENGINEER ADVISES DIESEL



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The First Books of their Kind.

A practical guide to the operation and maintenance of

RAILWAY DIESEL LOCOMOTIVES

By JOHN DRANEY,

Past President, United Association of Railroad Veterans

In collaboration with Diesel technicians from American Locomotive Co.; Baldwin Locomotive Works; Electromotive Division of General Motors Corp.; General Electric Co.; Westinghouse Electric & Mfg. Co.; and many others.

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472 pages, 220 illustrations, \$4.00

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388 pages, 235 illustrations, \$3.75

Both \$7.50 postpaid

Order from

DIESEL PROGRESS

2 West 45th St. New York 19, N. Y.

A Light Source for Ultra-High-Speed Photography

THE latest addition to the General Radio line of stroboscopic equipment is the Microflash, a light source for photographic exposures of the order of 2 microseconds. Originally designed for war use in the development and test of new types of ammunition, this instrument has many applications in industry to provide both knowledge and a record of mechanical phenomena occurring in a very small fraction of a second.



General Radio Microflash Equipment

The Microflash consists of a power supply, which charges a condenser to a high voltage, and means for discharging the condenser through a special gas-filled lamp, designed to dissipate most of the energy in about 2 microseconds, producing an intense, short flash.

The flash may be tripped by a make or break contact, by an electrical impulse, or by a microphone which picks up a sound impulse from the phenomenon to be photographed. The microphone is supplied, and an amplifier and gain control are built in. Ordinary film and camera equipment can be used with the Microflash. For full particulars write General Radio Company, Cambridge 39, Massachusetts.

New Carbon Remover and Parts Cleaner

A NEW and effective decarbonizing and degreasing material has been announced by Kelite Products, Inc. This new material, Kelite Parts Cleaner, is extremely effective for the removal of grease, dyes, gums, and carbon. Carbon deposits normally difficult to remove even by such methods as scraping or wire brushing are now softened by a soak in Kelite Parts Cleaner that they can be wiped off with a cloth.

The qualities of Kelite Parts Cleaner make it excellent for cleaning pistons, carburetors, fuel pumps, and various small parts. It is sold in a handy open topped 5 gallon container, with or without parts basket, and makes a readily available working tool for any shop.

RELIABLE... readable

**EVEN IN THESE
Rough Places**

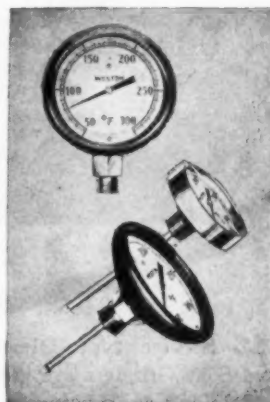


**WESTON
THERMOMETERS**
are ALL-METAL for ALL-ROUND ruggedness!

In tough spots like these, and many others too, *Weston All-Metal Industrial Thermometers* withstand shaking up without breaking down. Even the severe vibrations of pumping units or Diesel engines do not affect the long-term stability of Weston Thermometers.

Basic to their *all-round ruggedness* is an all-metal construction that insures sustained accuracy (within 1% full-scale) over long periods of time. There are no liquids, gases, capillaries or other troublesome parts. Simply an all-metal temperature element safely sheathed in a rugged stainless steel stem.

Weston All-Metal Thermometers are available in scale lengths 6", 9", 12" . . . stem lengths from 2½" to 48" . . . ranges from -100°F to +1000°F. Literature gladly sent on request . . . Weston Electrical Instrument Corporation, 579 Frelinghuysen Avenue, Newark 5, New Jersey.

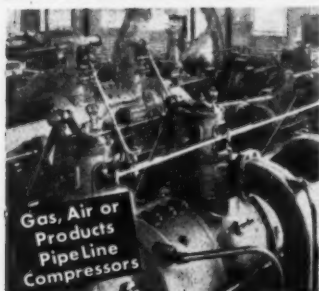


Weston *All Metal* THERMOMETERS

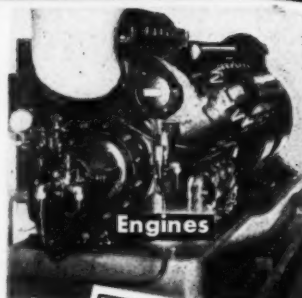
JACKET COOLING WATER PROBLEMS

RESPOND TO

HAERING GLUCOSATES



Write for latest "H-O-H Lighthouse" containing articles on Diesel Engine Cooling Water Treatment and Scale and Corrosion Control in Engine Jacket Cooling Systems.

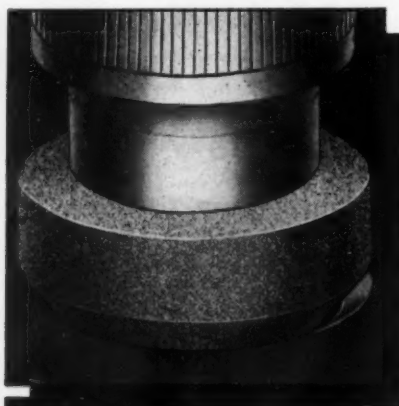


D. W. HAERING & CO., Inc.

GENERAL OFFICES:

205 West Wacker Drive, Chicago 6, Ill.

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**GRIND
DIESEL
VALVE
SEATS
THE
FACTORY
WAY**

Left: Close-up of patented HALL Eccentric or Point Contact Grinding Principle



HALL Service type Diesel Valve Seat Grinders are identical in principle and performance with large HALL Multiple Spindle Seat Grinders as used by leading manufacturers to insure finest precision and finish in their engine production; to provide finer performance longer.

With the HALL Model EDP Seat Grinder shown above any mechanic can quickly service diesel valve seats to factory standards of precision and finish. Thousands of marine, locomotive, automotive and stationary diesels require servicing less often because of HALL ground valve seats.

THE HALL MANUFACTURING CO., TOLEDO 7, OHIO

● Write for complete HALL Seat Grinder information TODAY

HALL

● Ask about HALL Wet Type Diesel Valve Refacers

American Locomotive Appoints George Mason

APPOINTMENT of George Mason as Director of Information in the Public Relations Department of the American Locomotive Company was announced by Lynn Mahan, assistant to the President in charge of public relations. He will make his headquarters at 30 Church Street, New York.

Mr. Mason was separated from the Army Air Forces recently after three years of active duty. During an 18 month tour of duty with the War Department Bureau of Public Relations he was assigned to missions which took him to the European and Pacific Theatres of Operation. He will revert to captain in the Air Corps Reserve upon completion of terminal leave.

Mr. Mahan announced that Mason's appointment was part of a reorganization and expansion of American Locomotive's public relations activities, including advertising, publicity and sales promotion. During the war both Mahan and Mason were assigned to public relations posts in the AAF Air Transport Command and completed missions together that took them many thousands of miles overseas.

Joins Sperry Marine Sales



Lt. Cmdr. Wm. C. Moore

Lt. CMDR. William C. Moore, U.S.N. (Ret.) has been appointed Assistant Marine Sales Manager of the Sperry Gyroscope Company, specializing in Merchant Marine Sales.

Commander Moore first joined Sperry in 1938 following graduation from Annapolis. He left Sperry to return to active duty as Ensign in 1941, being promoted successively to Lieutenant Commander. He is a member of the Propeller Club and American Society of Marine Architects and Engineers.

Walter Kidde Expands Organization

WALTER Kidde & Company Inc. moved their sales and executive offices from 140 Cedar Street, New York City to their main plant at 1020 Main Street, Belleville, New Jersey on December 17th. The company is branching beyond the fire extinguishing field into markets which employ either the type of manufacturing facilities Kidde now has, or the expanded selling organization the company is now building. The most recently acquired products which now are in production at the Kidde plant are:

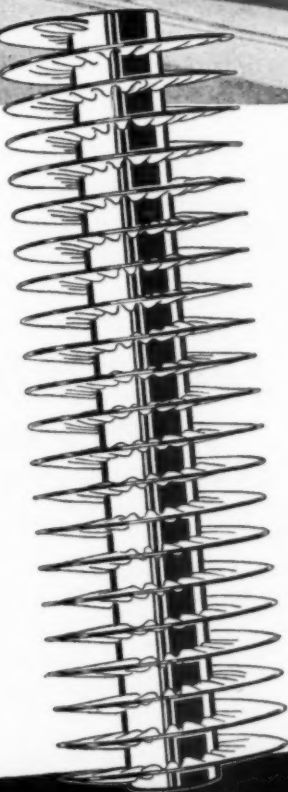
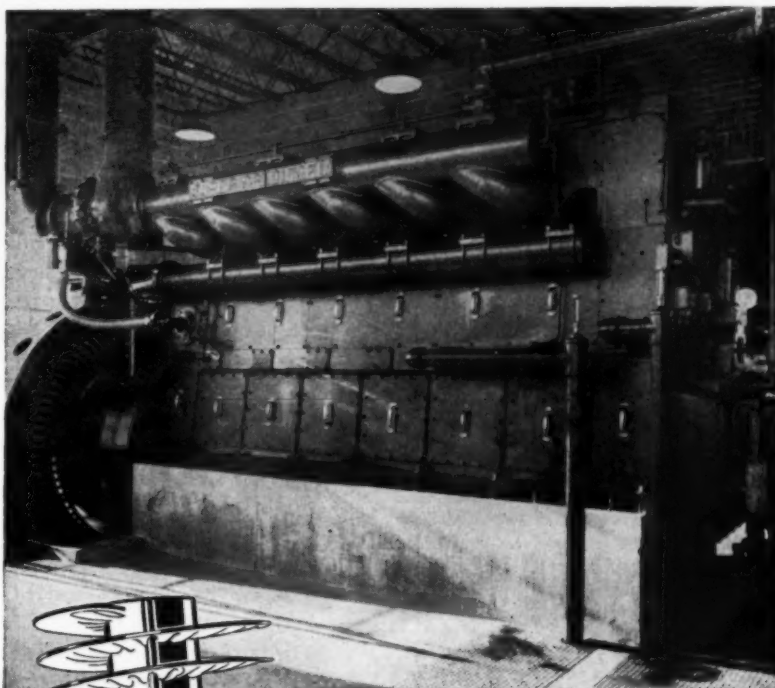
1. Kiddie Tension and Density Control, a device for the textile industry especially adapted for winding yarns where tension and package density are important.
2. Youngstown-Miller Oil Purifier, (Youngstown-Miller is a recently purchased company—now a subsidiary of Walter Kidde & Company Inc.).
3. Youngstown-Miller Plasticcoater, a machine which is used for heating plastic compounds into which metal parts are immersed to form a protective coating for shipping or storage.

LeTourneau Issues New Bulletin

AVAILABLE free, a new LeTourneau 4-page folder describes the Tournatruck—a flat bed, big-tired trailer powered by a Tournapull—and points out how plans for variation in size and style of trailer bed provide different combinations to meet specific requirements of each industry. Also shown is how Tournapull interchangeability gives a wider scope of usefulness by teaming the prime mover with Carryall scrapers, Tournatrucks, Tournacranes, and Tournatrailers. A copy of this new Tournatruck folder, Form No. TT-100, may be obtained from any LeTourneau Distributor, or by writing directly to R. G. LeTourneau, Inc., Peoria, Illinois.

Guth "Fusion Process" Described in New Bulletin

GUTH Welding Works has issued a new bulletin illustrating and describing how its "Fusion Process" has salvaged almost totally wrecked Diesel cylinder heads and blocks. One job featured has a five year record of performance since the block was repaired and before-and-after photographs graphically show the magnitude of the salvage job. A copy of this informative bulletin should be in the files of every Diesel installation and may be had by writing Guth Welding Works, McPherson, Kansas—ask for the bulletin, "Trouble Whipped by Guth."



For Peak Efficiency

SPECIFY AEROFIN COOLING

1. Highest practical heat transfer.
2. Compactness, light weight, durability
3. Adaptable design, low installation cost
4. Dependable ratings and assurance that such ratings will be maintained through years of service

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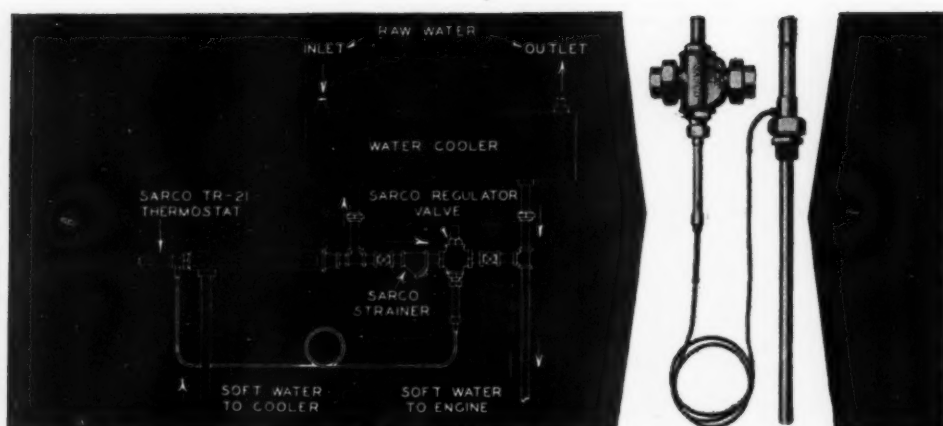
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PHILADELPHIA • DALLAS • TORONTO



By-pass Temperature Control FOR DIESEL COOLING WATER

The Sarco TR-21 Temperature Control is of the positive-acting, liquid-expansion type and has long been recognized as extremely accurate and reliable for all kinds of hot water and process temperature operations.

It is used extensively on Diesel engines because the by-pass method reduces the size of cooling equipment required.

The TR-21 is made in direct, reverse and three-way types, suitable for all Diesel operations. It is calibrated at the factory for any desired temperature, with adjustment provided by means of a key.

Where by-pass control is not desired, the Sarco Blender is eminently satisfactory. Ask for Bulletin No. 700 on Sarco Cooling Controls.

SARCO SARCO COMPANY, INC.
475 Fifth Avenue, New York 17, N. Y.
SAVES STEAM SARCO CANADA LTD., 85 Richmond St. W., TORONTO 1, ONT.

95D

EVAPORATIVE COOLERS

for Water Saving Economy

For many diesel engine installations, where cooling water is scarce or expensive or the installation of a cooling tower objectionable, usAIRco Evaporative Coolers provide a highly satisfactory and economical means of cooling jacket water or lubricating oil. You get greater fuel economy, because water and lubricating oil are always at same temperature. usAIRco Evaporative Coolers are space savers, too—simplifying piping systems.

**United States
Air Conditioning
Corporation**

Northwestern Terminal, Minneapolis, Minn.

OTHER PRODUCTS

COOLING & HEATING COILS • AIR WASHERS
BLOWERS • FANS • UNIT HEATERS
AIR CONDITIONING UNITS

FACTORY REPRESENTATIVES IN PRINCIPAL CITIES

An "Oscar" for Caterpillar

A GOLD "Oscar" for the best annual report for the year 1944 has been awarded Caterpillar Tractor Co., by Financial World magazine, which sponsored an annual report survey.

The winning report was chosen on the basis of excellence in financial, statistical and editorial content as well as format, typography and illustration, from among 2,500 reports considered by the judges.



A. T. Brown, left, Executive Vice President, Caterpillar, receives award from Weston Smith of Financial World.

Formal presentation of the "Oscar" was made October 2 at a dinner at the Waldorf-Astoria in New York City with Louis Guenther, president of Financial World making the award to A. T. Brown, executive vice president of Caterpillar Tractor Co.

Approximately 1,000 guests attended the dinner at which U. S. Senator Robert A. Taft of Ohio was principal speaker. The jury which made the selection was composed of Dr. Lewis Haney, professor of economics at New York University; C. Norman Stabler, financial editor of the New York Herald Tribune; Norman Bel Geddes, industrial artist; Glenn Griswold, public relations counsel and Sylvia F. Porter, financial editor of the New York Post.

Brodie System Acquired By C. N. Nielsen

THE firm of Brodie System was recently purchased by Christian N. Nielsen who was formerly Superintendent of the Fuse Division of Thomas A. Edison, Inc. Plans call for expansion in the near future to engage in complete servicing and rebuilding of Diesel engines in the field as well as in their plant. Brodie System has been established since 1932 and is well known for its work in the welding, metallizing and machining of large and small engine and machine parts. Wm. P. Kennedy, who was formerly General Manager, will remain with the firm as consulting engineer.

Socony Engine

ALVERI chief engineer, trial section Inc., succeeded, retired, it Van Liew, tion of as by Mr. Str

Mr. Stutso power equ voted muc sulting on Maritime with Soco when he Louis. He engineer o assistant c

Mr. Van I lubrication a lubricat Milwaukee see, before in Novem

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FLEXIGR

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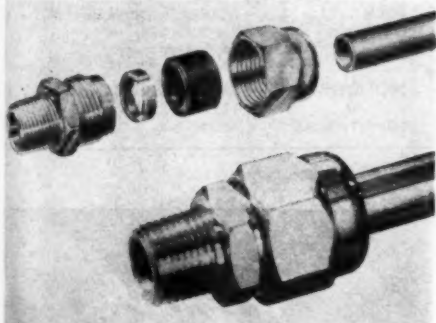
Socony-Vac Announces Engineering Changes

ALVERD C. STUTSON has been appointed chief engineer of the technical division-industrial section of Socony-Vacuum Oil Company, Inc., succeeding W. G. G. Godron, who has retired, it was recently announced. Gerald J. Van Liew, staff engineer, has assumed the position of assistant chief engineer, formerly held by Mr. Stutson.

Mr. Stutson, who is considered an authority on power equipment operation and lubrication, devoted much of his time during the war to consulting on critical problems with the Navy and Maritime Commission. He has been associated with Socony-Vacuum since September, 1937, when he became lubrication engineer in St. Louis. He came to New York in 1941 as staff engineer of the technical division and was made assistant chief engineer in January, 1943.

Mr. Van Liew possesses a broad background of lubrication experience as a result of 15 years as a lubrication engineer with Socony-Vacuum in Milwaukee, Wisconsin and Nashville, Tennessee, before coming to New York as staff engineer in November, 1944.

New Flexigrip Tubing Fitting



FLEXIGRIP tubing fittings which eliminate end preparation or soldering of the tubing and yet produce a strong, leakproof and flexible joint have been announced by Gustin-Bacon Manufacturing Company. The Flexigrip fitting, made in standard sizes from $\frac{1}{8}$ in. to $1\frac{1}{2}$ in. O.D., consists of four parts—the body, a gripping ring, synthetic rubber gasket and nut. To attach the fitting, the nut (with gasket and ring inside) is slipped over any plain-end tube, cut to desired length. The tubing end is inserted into the body as far as it will go and the nut tightened. Tightening the nut compresses the ring into a tight grip and moulds the gasket around the ring for a leak-proof seal that is so flexible it will withstand unusual vibration or impulse. The Gustin-Bacon Manufacturing Co., Kansas City, Missouri, will mail an illustrated bulletin on Flexigrip on request.

Seasoned Skill Backs Up Diesel Parts Production

THE Rhode Island Tool Company, a century-old concern, has in recent years supplied many parts for the Diesel industry. Drop forgings in great quantity are produced—as well as Diesel connecting rod bolts, special studs and other products required by the industry. The company offers facilities for the complete machining of forged blanks and bar stock and has specialized equipment for heat treating, grinding and Magnaflux inspection: Work is accu-

ately produced to customers' specifications.

B-W Superchargers Moves To Cleveland

OPERATIONS of B-W Superchargers, Inc., a Borg-Warner subsidiary, will be moved from Milwaukee to Cleveland where facilities of the Pesco Products Company will be made available for continuing production, R. J. Minshall, president of the subsidiary, has announced. The Milwaukee organization will continue to operate under its present identity.

IT'S NEW

HELIXHAUST

WATER-COOLED

MANIFOLD

FOR MODERNIZING YOUR 4 CYCLE DIESEL

BY TURBO SUPERCHARGING

This is what's inside! Helical baffles make four independent exhaust passages

- Helixhaust water cooling reduces temperature of exhaust gases and protects turbocharging. Makes engine room livable. Increases permissible supercharged rating of Diesel engine. It's simpler, neater, more attractive than any other... and it's competitive in price. These are only a few of the reasons why you should install Helixhaust Water-Cooled Manifolds.

Write Stewart for more information about this efficient manifold as well as Intake Manifolds, Water Inlet Headers, and Water Discharge Pipes.

One half of a 4 passage Helixhaust for 8 cylinder Diesel.

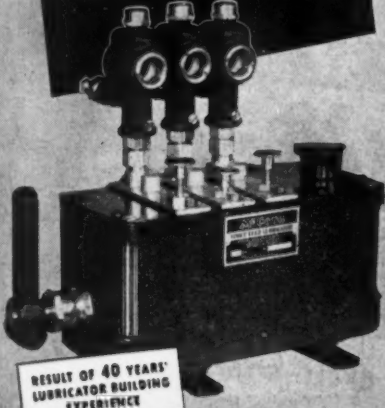
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FABRICATORS OF
IRON · STEEL · WIRE

**THE STEWART
IRON WORKS CO., INC.**
1381 Stewart Block
Cincinnati, Ohio

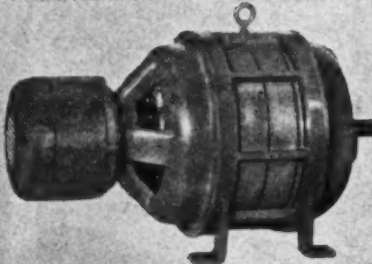
MCCORD
Class S.F.
LUBRICATORS

A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.



RESULT OF 40 YEARS' LUBRICATOR BUILDING EXPERIENCE

MCCORD CORPORATION
DETROIT 11, MICHIGAN
LUBRICATOR DIVISION



Columbia A.C. and D.C. Generators are built to meet highest performance standards. Complete range of application, including light, power, ship auxiliaries, or custom designed units.

D.C. UNITS range from 7½ to 200 KW.
A.C. UNITS range from 6¼ to 300 KVA.
Speeds and other specifications to meet requirements. Write for full information.

COLUMBIA ELECTRIC MFG. CO.
4519 Hamilton Ave., N.E., Cleveland 14, Ohio

COLUMBIA
GENERATORS
A.C. and D.C.

American Locomotive Elects Robert B. McColl President

IN a series of administrative changes recently announced by the board of directors of American Locomotive Company, Duncan W. Fraser was elected chairman of the board and Robert B. McColl was elected president. William C. Dickerman resigned as board chairman but will continue to serve as a director and a member of the Executive Committee. Mr. Dickerman also remains in a consultative capacity.



Robert B. McColl

Robert B. McColl, who has served since September 27 this year as executive vice-president, and who as vice-president in charge of manufacturing directed the company's vast war production program, began his career in the locomotive business near his native Kilmarnock, Scotland. After a period with the original builder of the steam locomotive, Robert Stephenson and Sons in Darlington, England, he joined the Montreal Locomotive Works where he worked during the first World War. He then returned to England with the Armstrong Whitworth Company but soon rejoined Ameri-

CASH IN ON YOUR IDEAS

For New Diesel Service Tools or Specialties!

Reliable Midwestern manufacturer wants marketable new products to supplement present line of Diesel specialties. Complete protection on your patents or patentable products, plus active sales promotion guaranteed.

Write today, briefly outlining your idea and its probable market. Send no drawings, blue-prints or models until requested. Address: Box 150, DIESEL PROGRESS, 2 W. 45th Street, New York 19, N. Y.

Highest Quality Gaskets & Oil Seals by FITZGERALD

Gasket Craftsmen for 40 Years

Gaskets of all types and materials to give reliable service under all Diesel operating conditions.

For full information write —

THE FITZGERALD MANUFACTURING COMPANY

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Branches: Chicago, Illinois; Los Angeles, California; Canadian FITZGERALD, Limited, Toronto

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SINCE 1906 **GASKETS**
THE COMPLETE LINE THAT COMPLETELY SATISFIES

MILWAUKEE OIL RE-REFINING EQUIPMENT
(VACUUM PROCESS)
For Marine & Stationary Internal Combustion Engines
HOLCOMB ENGINEERING COMPANY
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Governors

Standard Equipment on the world's leading Diesel Engines!

THE PIERCE GOVERNOR COMPANY, INC.
1603 OHIO AVE., ANDERSON, INDIANA

PETROMETER
FOR TANK GAUGING EQUIPMENT FOR DAY TANKS & CLEAN OIL STORAGE
PETROMETER CORPORATION
8 STAR SQUARE, LONG ISLAND CITY, N. Y.

can Locomotive
Schenectady
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Carl F. Schenck

can Locomotive as assistant manager of the Schenectady, N. Y. works. He has since been manager of this plant; of the company's Diesel engine manufacturing division; president of the Alco Products, Inc., a subsidiary of the company; and vice-president in charge of manufacturing of American Locomotive.



Duncan W. Fraser

Mr. Fraser, who has been president of the company since 1940, entered the locomotive business as an apprentice at the Rhode Island Locomotive Works in Providence, and in 1904 was transferred to the Montreal Locomotive Works, Ltd., at Montreal, Canada. After becoming managing director of this Canadian affiliate of the American company, he was elected vice-president of American Locomotive in 1920 and became a director in 1924.

The new officers of American Locomotive assume similar posts with Montreal Locomotive Works, Ltd., while W. L. Lentz, recently elected vice-president in charge of manufacturing of American Locomotive, also becomes vice-president of the Montreal works.

Caterpillar Appoints District Men

APPOINTMENT of Carl F. Schober and Captain Kenneth F. Ames to the central sales division of Caterpillar Tractor Co. is announced



Carl F. Schober

Capt. K. F. Ames

by J. J. Valentine, central sales division manager of the company.

Mr. Schober, who will serve as district representative in the states of Texas and New Mexico, joined "Caterpillar" in 1941 as a member of the treasury department and was later assigned to the company's Washington, D. C. office to assist in various wartime activities. He was transferred to central sales in August, 1945.

Captain Ames returns to the central sales di-

vision as a district representative in Montana, North Dakota, Saskatchewan and Alberta after more than four years in the service. He joined the sales training division of "Caterpillar" in 1936 and then became agricultural representative in the Minnesota and North Dakota territories.

Sarco Opens Washington Office

SARCO Company, Inc. has announced the opening of its Washington office at 1129 Ver-

the **SAFE WAY**

to cope with

**FOULING and
LOAD FLUCTUATIONS**

IN DIESEL LUBE OIL AND JACKET WATER COOLERS

ROSS

To operate continually at desired performance, a cooler *must* incorporate factors of safety to allow for the effects of fouling, as well as fluctuations in load and operating conditions. Otherwise, performance can drop below practical limits, and shutdowns can be excessive.

Ross *always* stresses a thorough analysis of the fouling tendencies of the fluids being circulated, the velocities to be maintained, temperature ranges and anticipated fluctuations in load as well as changing climatic or operating conditions . . . and in your particular installation, you may prefer to avail yourself of Ross' experience in determining and analyzing your operating problems.

This service, cheerfully given by Ross Engineers, assures the selection of a lube oil or jacket water cooler best suited to your needs. Remember—your conditions can be met exactly by Ross, through the tailor-made features of Types "CP" and "BCF" Coolers, for large and small H.P. requirements, respectively.

THESE BULLETINS WILL
HELP YOU

"CP" COOLERS
No. 5322

"BCF" COOLERS
No. 4922




Ross equipment is manufactured and sold in Canada by Horton Steel Works Ltd., Fort Erie, Ontario

ROSS HEATER & MFG. CO., Inc.

1425 WEST AVENUE

Division of AMERICAN RADIATOR & Standard Sealing Corporation

BUFFALO 13, N. Y.



**TUTHILL
MEANS DEPENDABLE
PUMPS**

*For High Pressure
Service, Specify MODEL CK*

You can't beat this compact small pump for high-pressure service on machine tools, engines and hydraulic mechanisms. This internal-gear rotary pump is designed to save space, material and money and to provide long, dependable service. Capacities from 1 to 50 g.p.m. and pressures up to 400 p.s.i. Direct motor drive, V-belt units, and integral drives. Write for Model CK bulletin.

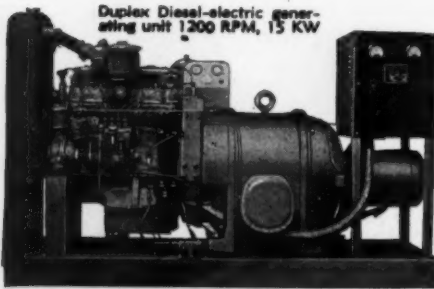
TUTHILL
TUTHILL PUMP CO. • 939 E. 95th ST., CHICAGO 19, ILL.

Generating Units

5 K.W. to 100 K.W. A.C. or D.C.

Close regulation of voltage and frequency is an outstanding feature of the generating units we build with either Diesel or gasoline prime movers. We are also equipped to supply any type of instrument panel required.

Manufacturers of engine generator sets for over 20 years.



Duplex Diesel-electric generating unit 1200 RPM, 15 KW

Duplex Truck Co.
Lansing, Michigan

mont Ave. N.W., Washington 5, D. C. The office is in charge of Major H. F. Collins, formerly of U. S. Army Engineers. Mr. Collins represented the company in eastern Pennsylvania for a number of years and is thoroughly familiar with its business.

Marine Industry Leaders to Exhibit in National Marine Exposition

ROBERT E. MONTGOMERY, President of National Marine Expositions, Inc., under whose management this Exposition will be held this year and every two years at Grand Central Palace, New York City, during National Foreign Trade Week, which includes National Maritime Day, May 22nd, says:

"This praiseworthy effort upon the part of The Propeller Club of the United States to intelligently serve the American Merchant Marine at the most vitally important transition period in its long and glorious history, has been promptly and enthusiastically endorsed by the outstanding leaders of the Marine Industry. This cooperation is readily understandable," Mr. Montgomery points out, "for the following reasons: First, industrial leadership, like any other, involves a responsibility and an obligation to the field in which that leadership has been attained. Secondly, the general public must be made aware of how really dependent our future national peace, progress and prosperity are upon the maintenance of our hard-won global merchant marine supremacy. Thirdly, this national exposition offers the opportunity to actually show and demonstrate the latest in marine products and services to more thoroughly qualified users and buyers in one week, than any sales force possibly could contact in many months. And last, with thousands of these buyers in daily attendance, old friendships will be renewed and many new ones made, forming the basis for increased future sales."

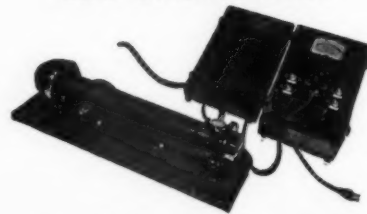
James Adair Joins Star Electric Motor Co.

FOR the last nine years a sales engineer in the Newark office of Westinghouse Electric Corporation, James Adair moves to Star Electric Motor Co. to represent that company in the New Jersey industrial area. Mr. Adair came to this country from Belfast, Ireland to enter Rochester Institute of Technology.

Valentine to Direct Mack Dealer Sales

APPOINTMENT of Lt. Col. H. P. Valentine as manager of Mack dealer sales and operations is announced by A. C. Fetzer, vice-president of Mack-International Motor Truck Corp. Colonel

Photoelectric CRC SMOKEMETER



Objective indication of smoke density, independently of human judgment and of light conditions.

Approved by the Coordinating Fuel Research Committee. Manufactured by

PHOTOVOLT CORP.

95 Madison Ave. New York 16, N. Y.

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HERE TODAY? 33-30 K.W. - 50 K.W.

PORTABLE DIESEL GENERATOR SETS



INTERNATIONAL UD-14-UD-18
BRAND NEW - SPOT DELIVERY
RADIATOR COOLED - SKID MOUNTED
FULLY ENCLOSED

60 CYCLE 127/220 VOLT **BARGAIN** 50 CYCLE 230/400 VOLT

ROBERT SCHOONMAKER
Port Washington, Long Island, N. Y.
Phone Roslyn 1230

NOZZLE TESTERS

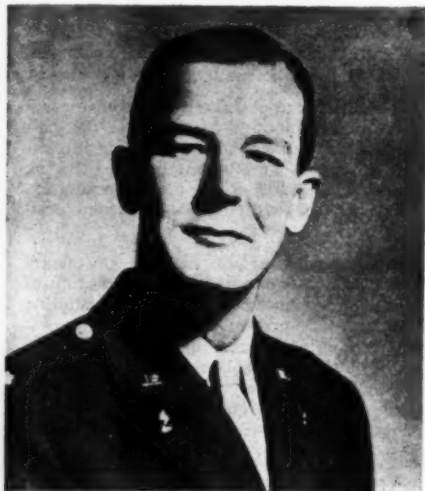
One
Nozzle Tester
for all
Standard Types
of Diesel Nozzles



Write for Bulletin No. 1170

THE BUDA COMPANY
1502 Commercial Avenue
Harvey (Chicago Suburb) Illinois

Valentine comes to the Mack organization after service in the War Department where he was chief of the Transport and Automotive Branch, production Division Headquarters, Army Service Forces, with staff responsibility for the army's huge war production of automotive, shipbuilding, construction machinery and railway equipment.



Lt. Col. H. P. Valentine

Prior to his war service, he was with the Chrysler Corp. for 11 years in key executive positions. A graduate of Harvard University, 1926, he began his career in the automotive industry with the Packard Motor Car Company as an apprentice. Colonel Valentine will make his headquarters in the Mack general offices in New York's Empire State building.

Morse Chain Appoints Works Manager

FRANK M. HAWLEY, vice president and general manager of the Morse Chain Company,



Frank C. Tippery

Division of Borg-Warner Corporation, announces the appointment of Frank C. Tippery as works manager of the Ithaca plant. Mr. Tippery comes to Morse Chain Company from the Ford Motor Company where he has acted in many capacities, particularly on production problems and the supervision of tools and dies, gauges and production equipment.

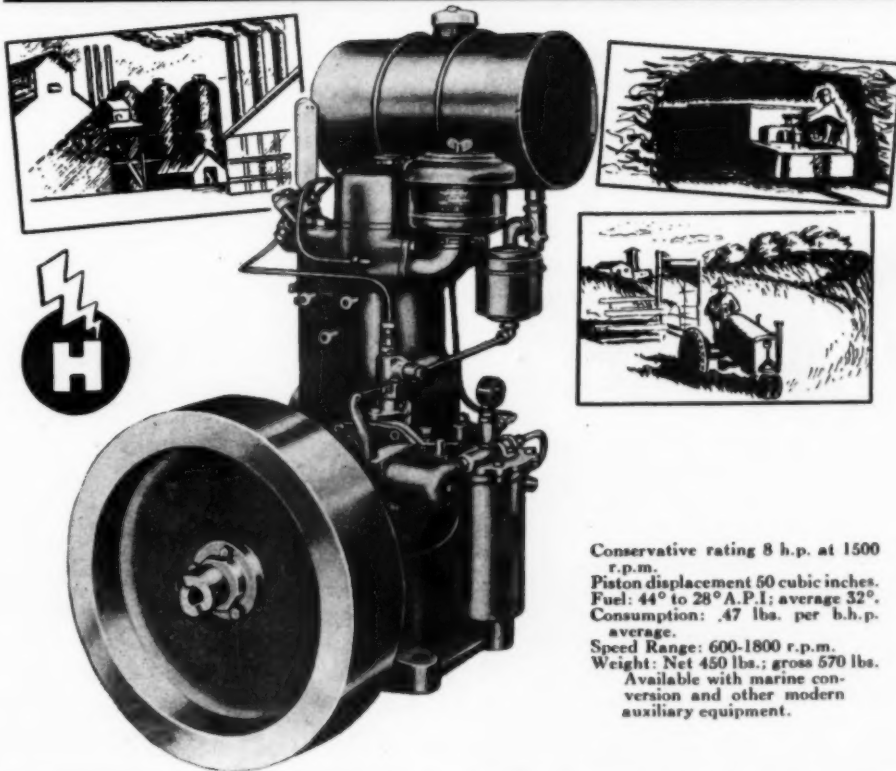
During the past two years Mr. Tippery assisted the purchasing department, contacting many Ford suppliers on tooling up the Ford bomber plant and the Highland Park plant where the

Sperry gyroscope project was developed. During the war he also acted as supervisor of inspection on Pratt & Whitney engines.

Rogers Diesel and Aircraft Service Headed by Walter Allard

THE Rogers Diesel and Aircraft Corporation announces the reorganization of its service department under the direction of Walter Allard. Mr. Allard served as consulting engineer and assistant production manager for the corporation during its wartime program of manufacturing Army vehicles.

The ALL-PURPOSE DIESEL ENGINE



Conservative rating 8 h.p. at 1500 r.p.m.
Piston displacement 50 cubic inches.
Fuel: 44° to 28° A.P.I.; average 32°.
Consumption: .47 lbs. per b.h.p. average.
Speed Range: 600-1800 r.p.m.
Weight: Net 450 lbs.; gross 570 lbs.
Available with marine conversion and other modern auxiliary equipment.

The most efficient, economical and dependable power available for every purpose where a small, heavy duty unit may be required for any power or lighting application—for business and industry; service stations and garages; mines; farms, ranches and dairies; municipalities; public buildings; resorts; parks; and projects of every character. Full Diesel, embodying the most modern Diesel engineering practice and developments. Write for Catalog No. 101-A.

HALLETT MANUFACTURING COMPANY

New York Chicago INGLEWOOD, CALIF., U.S.A. Detroit San Francisco
Cable Address: HALMFG. Code: Bentley's

Established 1916

HALLETT DIESEL ENGINE

There are No Blow Bys

with the **AUTO-DIESEL**
GAPLESS PISTON
RING...



Pat.
Pend.

Semi-
Assembled

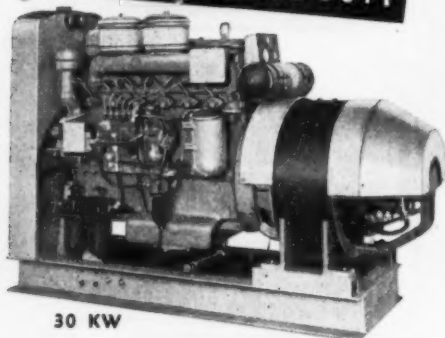
Here is a new type ring that is destined to fill a long felt need. The AUTO-DIESEL Helicam GAPLESS Piston Ring consists of two IDENTICAL parts that interlock when completely assembled and forms a ring without a gap. It is adapted for carrying oil within itself if desired—it can also be used as an oil ring while retaining its expanding features. It can also be made a contracting ring for sealing shafts, bearings, for replacing packings, etc. and many other applications. Made in sizes from 1" to 36" for all industrial operated equipment — stationary and mobile.

THE AUTO-DIESEL PISTON RING CO.
3151 SUPERIOR AVE. CLEVELAND 14, OHIO

QUALITY RINGS SINCE 1921

ELECTRICITY

for **STAND-BY SERVICE**
OR
CONTINUOUS DUTY



30 KW

Choose the correct Electric Plant for your needs from the "U.S." complete line. For emergency stand-by service, continuous duty, or portable uses. Gasoline or Diesel—AC or DC. Write for information.

U. S. MOTORS CORP.
542 Nebraska Street
OSHKOSH, WISCONSIN

U.S. DIESEL
ELECTRIC PLANTS



Walter Allard

Mr. Allard, who has trained service groups for the Civilian Conservation Corps and interstate trucking companies, operated as service manager for various passenger car dealers throughout the Middle West. Much of his work has involved research into the setting of maintenance standards and tolerances for heavy duty equipment.

W. M. Walworth Elected
Mack Chief Engineer



W. M. Walworth

ANNOUNCEMENT is made by C. T. Ruhf, president of the Mack Manufacturing Corpora-

Write for Bulletin

CHECK
YOUR FUEL
SUPPLY
AT A
GLANCE



THE **LIQUIDOMETER** CORP.

36-38 Broadway Ave. Long Island City, N. Y.

OAKITE SHORT-CUTS

to **Diesel cleaning**

Fuel Oil Pre-Heaters
Quickly Desludged

Maintenance cleaning plays an important part in the efficient operation of Diesels.

Take, for example, fuel oil pre-heaters. If accumulated sludge deposits are not periodically removed, atomization is impaired . . . poor combustion results, bringing in its wake, hard starting, fuel waste, excessive carbon deposits, increased running costs.

You can dispose of fuel oil pre-heater maintenance cleaning with a minimum of time, effort, and expenditure by installing performance-proved Oakite cleaning procedures. For specific details on this and many similar Diesel maintenance cleaning tasks, have us mail you a **FREE** copy of our specially prepared 20-page **Power Plant Digest**. No obligation, of course!

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Technical Service Representatives in Principal Cities of the U. S. and Canada

OAKITE *Specialized* **CLEANING**
MATERIALS—METHODS—SERVICE—FOR EVERY CLEANING REQUIREMENT

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are being effected by Fel-Pro Developments in
Thiokolized Gaskets

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Through Thiokolizing and other treatments of such gasket materials as Felpak, Karropak, Fishpaper, Chipboard, Fibre, Cork and others . . . a host of new, improved gaskets are being produced for thousands of America's leading manufacturers.

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with Sealing Materials,
Gaskets, Packing, Sound
and Vibration Dampeners,
Washers, specially die-cut,
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tion, of the election by the board of directors of W. M. Walworth as vice-president and chief engineer. Mr. Walworth has been acting chief engineer since March, 1945. He joined Mack in 1939, coming to the truck manufacturer after 12 years in the engineering department of Reo Motors, Inc., at Lansing, Mich. He entered the automotive field immediately after graduation from Massachusetts Institute of Technology in the class of 1926. Assigned first to Mack's Allentown, Pa., plant, he was soon moved to the New Brunswick, N. J., plant where he remained as executive engineer until his appointment as acting chief engineer of the Mack Manufacturing Corporation in March. His headquarters will continue to be in the company's general offices, Empire State Building, New York City.

New Plant for Durabla Manufacturing Company

THE Durabla Manufacturing Company, makers of Durabla Valve Units for Reciprocating Pumps, Diesel Engines, and Compressors, (and also manufacturers of Durabla Sheet Packing and Gaskets,) has moved its valve plant from Berwyn, Pa., to a newly reconstructed building at Wayne, Pa. The new plant, which is handling a large volume of orders for Durabla Valves for standard equipment and for replacement units, has been laid out with special reference to easily accessible storage of raw materials and component parts; efficient routing through assembly and machining areas; and carefully arranged assembly areas based on the company's long experience in manufacturing high efficiency valves.

WEST COAST DIESEL NEWS

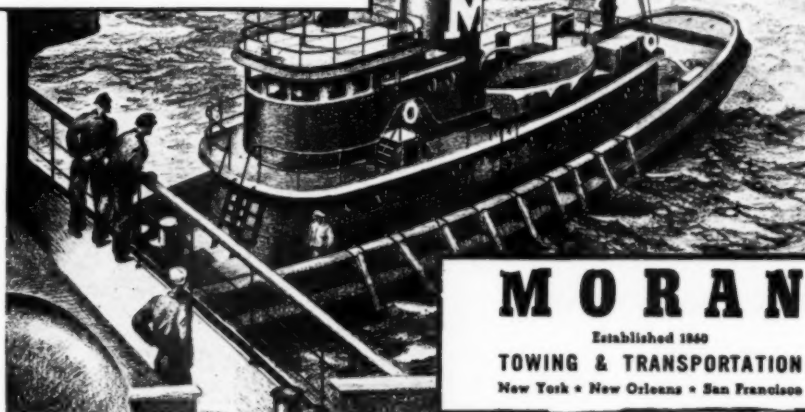
By FRED M. BURT

DIESEL ship *California Redwood*, a new lumber schooner, launched in Portland for the Hammond Shipping Company, is powered with two 1200 hp. Union Diesels, with three 150 hp. 8 in. x 10 in., 600 rpm. Worthington Diesels for auxiliaries.

AN 850 hp. Enterprise 8-cylinder Diesel turning 380 rpm. is the main power plant of the steel tuna clipper, *Sun Dial*, built by Puget Sound Boat Bldg. Co., for Fred Brown and associates. Auxiliaries are three 112-hp., Atlas Diesels, each driving a 90-kw. Fairbanks-Morse generator.

THE *E. S. Lucido*, built by the Martinolish Shipbuilding Co., San Francisco, for pioneer fisherman, E. S. Lucido, is an 88 ft. purse seiner. Its main power plant is an Enterprise 400-hp. . . . And now please turn to page 94 . . .

Skilled operation and diversified equipment, backed by 85 years of wide experience, enable Moran to carry out towing assignments, whether harbor, inland, coast-wise or deep sea . . . with dispatch.



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TOWING & TRANSPORTATION
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HEATS MILL AND OFFICE

at No Fuel Cost

This 375 H P Buckeye Diesel in flour mill does a good job in getting 12 K W per gallon of fuel carrying a steady 2300 V load and by exhausting into Sims Exhaust Gas Boiler furnishes heat for Mill and office buildings. The Sims Boiler operates dry in off-heating season as a silencer. That's how to get the most out of your Diesel investment.

Consult with Sims about generating steam-heating water or air from the exhaust gas of your diesel. Write for Sims Heat Recovery Book.

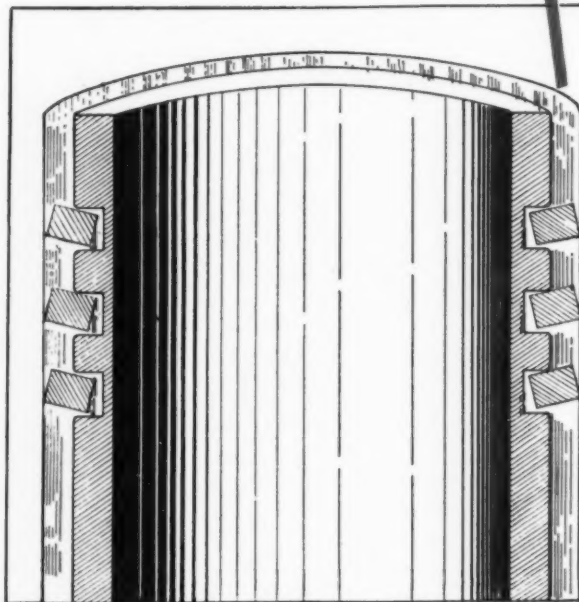


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SIMS HEAT RECOVERY EQUIPMENT

HEAT EXCHANGERS • EXHAUST GAS BOILERS • ENGINE SILENCERS • STORAGE WATER HEATERS • OIL HEATERS • OIL COOLERS • FEED WATER HEATERS AND UNIT TYPE PULVERIZERS

Diesel Engine **DANGER** points



"ROCKING" PISTON RINGS SCORE LINERS

"Rocking" piston rings, the result of excessive wear in the ring grooves of Diesel engine pistons, are the source of considerable lay-off time and expense to Diesel operators—Wear-enlarged grooves permit rings to rock, and "bite" into cylinder walls. The result is usually a costly overhaul to replace not only pistons, but worn liners as well. It's a danger point in many Diesels—but "rocking" rings and their cause, enlarged ring grooves, can be minimized.

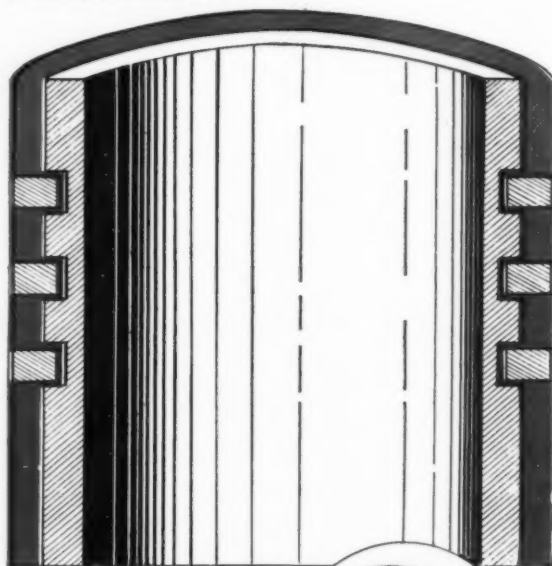
RPM DELO Oil clings to hot engine areas often left exposed to wear by ordinary un compounded oils.

RING GROOVE WEAR REDUCED BY RPM DELO OIL

In a series of 1000-hour laboratory tests, Standard scientists proved that ring groove wear can be minimized with RPM DELO Diesel Engine Lubricating Oil.

Piston ring groove wear in an engine operated on a top quality straight mineral oil was thirty times that experienced with RPM DELO Oil in an identical test.

RPM DELO Oil reduces wear due to a metal-adhesion additive which makes it cling to and lubricate hot engine areas other oils often leave bare, and to other compounds which eliminate stuck rings and engine deposits, prevent bearing corrosion, stop oil foaming.



To match the fine performance of RPM DELO Oil use these equally efficient companion products from the same famous "RPM" line—

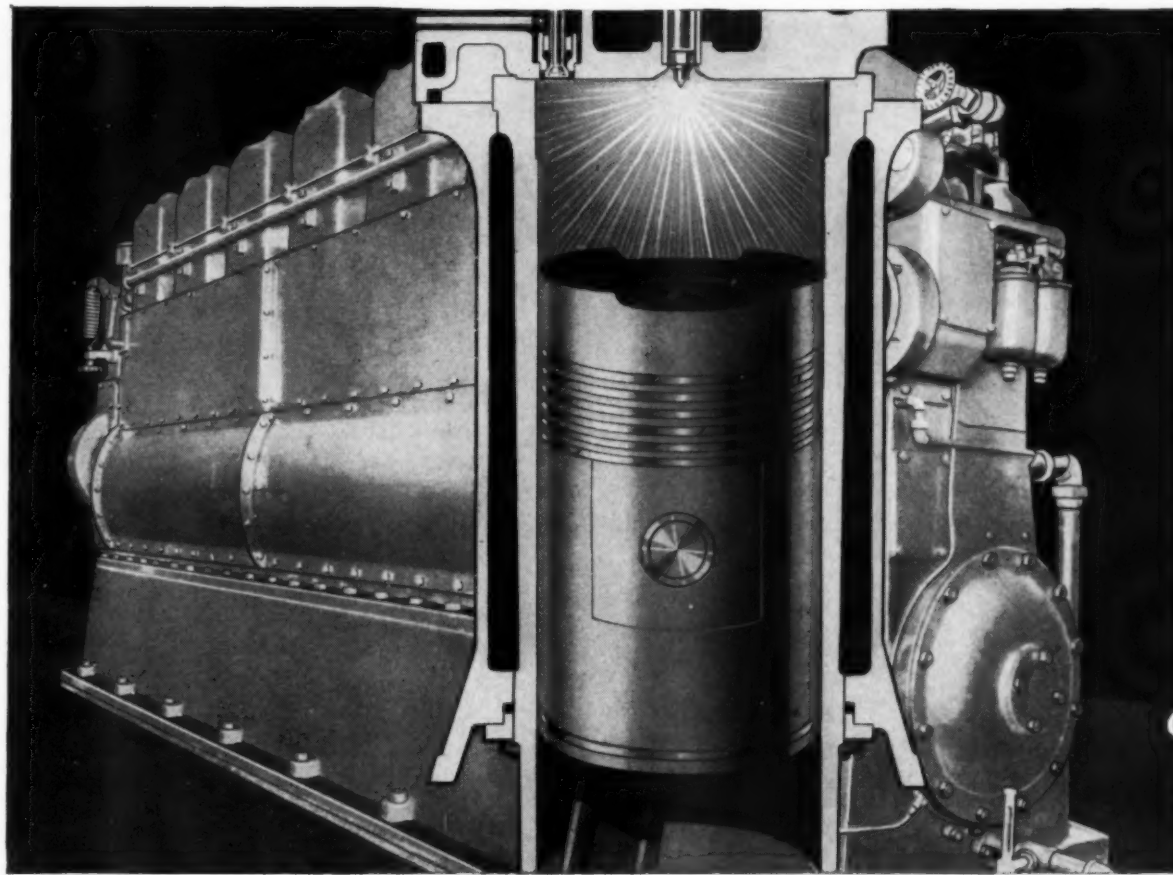
RPM HEAVY DUTY MOTOR OIL
RPM GEAR OILS & LUBRICANTS

RPM COMPOUNDED MOTOR OIL
RPM GREASES

For additional technical information write Dept. T-X, Standard of California, San Francisco 20, California, or California Commercial Company, 30 Rockefeller Plaza, New York 20, N. Y.

STANDARD OF CALIFORNIA





Harnessing 6 "Cannon-power" demands something special in rings!

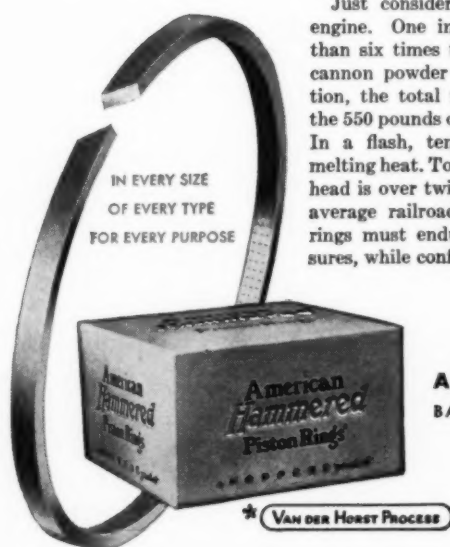
Ever stop to think what happens in a Diesel cylinder when it fires?

Just consider a single cylinder in a large engine. One injection of fuel contains more than six times the thermal energy of a 20mm cannon powder charge. (In 35 minutes operation, the total thermal energy equals that in the 550 pounds of TNT in a 1000-pound bomb.) In a flash, temperatures zoom above steel-melting heat. Total pressure against the cylinder head is over twice as great as the weight of an average railroad locomotive. And the piston rings must endure this heat, seal these pressures, while conforming to the varying face and

diameter of a cylinder wall!

That's why—at American Hammered—everyone makes it his business to make ever better rings... why our ring research laboratory constantly prospects for new alloys and triple-checks all current production... why our chrome-plating department is multiplying ring life through the magic of PORUS-KROME®... why our engineers are always ready to diagnose your ring needs, and prescribe from our 30,000 types and sizes, the set-up that mates with your individual job.

Let us give you rings that will give you better Diesel performance.



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AMERICAN HAMMERED PISTON RING DIVISION
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"NORMA-HOFFMANN"
PRECISION BEARINGS
FOR EVERY LOAD, SPEED, AND DUTY
108 DISTINCT SERIES OVER 3000 SIZES
BALL, ROLLER and THRUST
1/4" to 22" Bore—Metric and Inch Sizes
Write for the Catalog and Engineering Counsel
NORMA-HOFFMANN
BEARINGS CORP., STAMFORD, CONN.
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CRACKED HEADS WELDED
• **ENGINES REPAIRED**
Satisfaction **VALVE SEATS**
Guaranteed **HARD SURFACED**

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Brooklyn,
New York
AN ENGINEERING SERVICE

BURKE
50 YEARS of Experience
Send your generator problem to specialists in the manufacturing of Generators to specifications. For more power in a hurry... Write for data.
A.C. AND D.C. GENERATORS AND MOTORS
BURKE ELECTRIC CO. • ERIE, PA.

Diesel; auxiliary an 80-hp. Buda Diesel, driving a 40-kw. Fairbanks-Morse generator.

PACIFIC Boat Bldg. Co., Tacoma, is building two refrigerated draggers. The 72 ft. dragger for Frank Barcott, Everett, Wash. has a 250-hp., Cooper-Bessemer Diesel; the 77 ft. vessel for E. E. Johnson, Tacoma, is to have a 250-hp. Atlas Diesel.

THE Kettneburg Boat Works, San Diego, has an order for two 38 ft. combination fishing boats to be powered with 40-hp. "Caterpillar" Diesels. They are being built for Mexican interests.

LONG BEACH naval architect, G. Bruce Newby has designed a tuna clipper 105 ft. O.A., 25 ft. beam, 12 ft. deep—builders, National Iron Wks., San Diego; main propulsion unit an Atlas Imperial Diesel engine of 540-hp., super-charged.

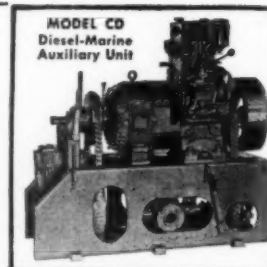
TWO other Newby-designed clippers for Westgate Seafoods Products, San Diego are 141 ft. x 29 ft. x 15 ft. 3 in. with a 600-hp. Washington Diesel, and the other a 112 ft. x 26 ft. x 14 ft. 9 in. has a 540-hp. Fairbanks-Morse Diesel.

THE 200-ton, wooden tuna clipper *Portuguesa* built by the Lynch Shipbuilding Co., at San Diego for the Manuel Rosa family, has an 8-cyl. 12 in. x 15 in. Enterprise, 800-hp. 375 rpm., super-charged Diesel; auxiliaries are two 112-hp. Caterpillar Diesels, each driving a 110-volt, 75 kw., direct current generator.

TWO generating sets made by Bardco Mfg. & Sales Co., Los Angeles, were installed in the Dragich Bros.' 88 ft. purse seiner, built at Harbor Boat Bldg. Co., Los Angeles. These units consist of 40-kw., 120-208 volt, 3 phase, 60 cycle generators with built-in exciters driven by Super... And now please turn to page 99...

SPACE SAVER!

**POWER
LIGHT
WATER
AIR**
All in One
Compact
Package!



ENGINE—8 h.p.
GENERATOR—3 1/4 or 5 kw.
AIR COMPRESSOR—11 or 20 c.f.m.
PUMP—60 or 90 g.p.m. at 60#. Net Weight—1,400 lbs.
Many other combinations and Diesel-Generator sets available, up to 10 kw.

WRITE FOR BULLETIN 151
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LISTER-BLACKSTONE, INC.

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**45,000 Horsepower
FOR YOUR SELECTION
Modern—Immediate Delivery
COMPLETE PLANTS**

Engine Generator Sets
1800 H.P.—1500 KVA Capacity and Smaller Sets

Fairbanks-Morse	Busch-Sulzer
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PORTABLE POWER UNITS

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Specify Your Diesel Power Requirements

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Business Established 1898

UNUSUAL OPPORTUNITY

Established manufacturer of Marine and Industrial Diesel engines requires services of experienced Diesel Sales Engineer to cover West Coast Territory. Financial remuneration commensurate with results.

Write fully as to experience, age, present earnings, etc. Replies confidential. Only experienced man considered. Our employees know of this ad. Address: Box 155, DIESEL PROGRESS, 2 W. 45th St., New York 19, N. Y.

WANTED

DIESEL ENGINE GENERATOR UNITS
2000 H.P. to 4500 H.P.—TOTAL 9000 H.P.

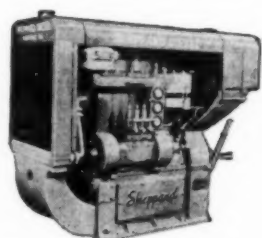
Prefer complete generating plant, but engine only will be considered. Address: Box 154, DIESEL PROGRESS, 2 W. 45th St., New York 19, N. Y.

WHERE LIGHTS BURN
AND WHEELS TURN...

DIESEL'S the Power... *Sheppard's* the Diesel!

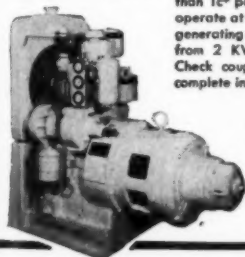
When power costs become an important item of operating expense, it's time to investigate the economy of a Diesel engine.

Sheppard Diesels have *proved* their economy of operation by reducing power costs in hundreds of installations...frequently as much as 65%! If your answer to the rising cost of labor and materials is the reduction of power bills—remember, *Diesel's the power... Sheppard's the Diesel!*



Model 6A-1 3-cylinder Sheppard Diesel power unit develops 25 continuous horsepower at 1200 R.P.M. Delivered complete...ready to run...including power take-off and clutch. Costs about 96¢ to operate at full load for an 8-hour day. Other models ranging from 3 1/4 H.P. to 56 H.P. The coupon below will bring complete information on the power unit suited to your requirements.

Sheppard 5 KW generating set is powered by a Model 7 1-cylinder Sheppard Diesel developing 8 continuous horsepower at 1200 R.P.M. Costs less than 1¢ per KW hour to operate at full load. Other generating sets ranging from 2 KW to 36 KW. Check coupon below for complete information.



*Using 8¢ per gal. fuel oil

R. H. SHEPPARD COMPANY, INC.
16 MIDDLE ST., HANOVER, PA.

Forward complete information on Sheppard Diesel — Power Units — Generating Sets.

Name _____
Address _____
Power Unit H.P. _____ Generator Capacity _____

DIESEL NEWS—continued from page 94

rior 6-cyl. Diesels. Main power plant is a 400-hp., 6-cyl. Enterprise Diesel.

PURSE seiner, *Stella Maris*, just released from the Navy is being repowered with a new 250-hp. Enterprise Diesel engine at the Martinolich yards, San Francisco.

A ROUND-TRIP from Astoria, Ore., inland on the Columbia River to the head of navigation, 465 miles, and return, was made by a party of engineers, economists and port and dock operators, under the auspices of the Portland Chamber of Commerce. This difficult trip with hazards of rapids, shoals, sharp turns, backing and filling, locks, etc., was made in the Tidewater-Shaver towboat *Defiance* powered with twin 600-hp. General Motors Diesels.

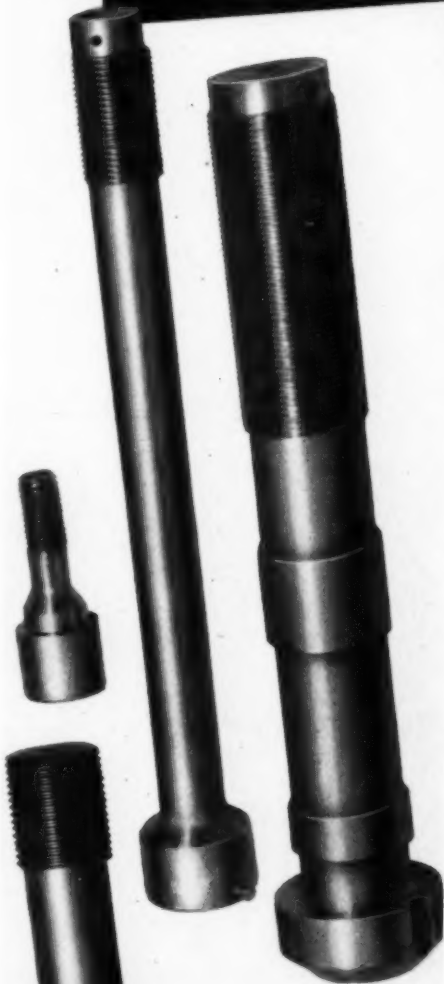
AL LEWIS, owner of the Reliable Welding Works, Olympia, Wash., is building a 49 1/2 ft. steel-hull cruiser for his own use. It is one of the first large type steel yachts to be powered with twin Chrysler Diesel engines. The two engines will rate 85-hp. and will drive the craft through 2 1/2-to-1 reduction gears.

THE new home of the Jules Engine & Equipment Co. in Seattle is a very handsome sales and service center for Gray marine motors—also Marine Products pumps, Federal-Mogul propellers, Maxim silencers, Willard, Exide and Delco batteries, Delco and Kohler generator sets, Intervox radio equipment and others. Gray dealers working through the Jules distributorship include four in southwestern Alaska and five in the southeastern part; also more than a dozen in Washington.

THE 65-ft. otter trawler, *Buena Ventura*, owned by A. Paladini, Inc., San Francisco, is being repowered with a Caterpillar marine Diesel engine purchased through Thomas A. Short Co.

THE 35-yr. old cannery tender, *Independent No. 2* is being re-built at Columbia Boat Bldg. Co. ways and repowered with a new 150-hp. Cummins marine Diesel.

THE 134 ft. steel tuna clipper, *Princess Mary* built by John Breskovich, Tacoma for Sun Harbor Packing Co., San Diego (probably to be re-named *Sun Dial*) has one of the largest tuna carrying capacities, over 500-tons. Planned for long-range operations, she is powered with an 840-hp., 8-cyl., Enterprise Diesel; has three 120-hp. Atlas Imperials Diesels for refrigeration.

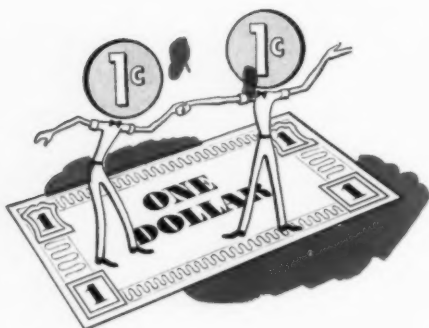


Rely on RITCO for Diesel engine studs and connecting rod bolts and nuts, accurately made to your specifications.

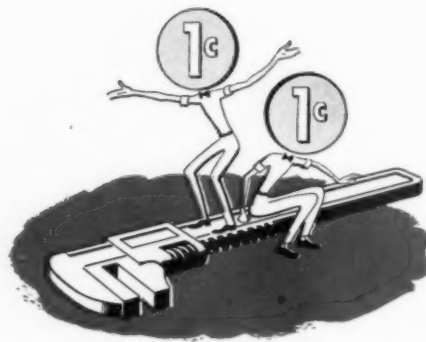
Machined parts to order in any metal, sizes up to 2 1/2" diam.; also, drop forgings, hand screw machine products, and centerless grinding. Let us know your requirements.

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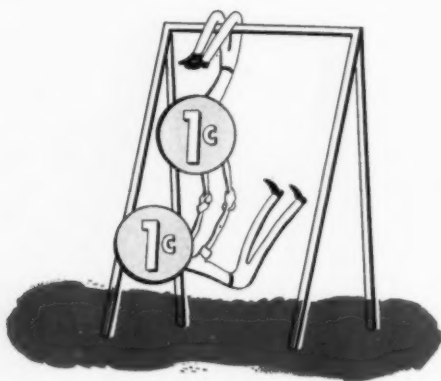
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Oil (even the very best oil) takes less than 2c out of every dollar of operating expense.



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